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EXCAVATIONS AT SANNATHI
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FOREWORD

The joint collaborative project at Sannathi was the first such venture between the Archaeological Survey of India and the Society for South Asian Studies. It marks a revival and a cementing of the valued relationship between the archaeological communities in India and Britain; a relationship which is historically punctuated with names such as Alexander Cunningham, James Burgess, Sir John Marshall, Sir Mortimer Wheeler and Raymond Allchin.

The Society for South Asian Studies is one of the twelve schools, institutes and societies engaged in academic fieldwork overseas supported by the British Academy, a private and independent learned society which also serves as the principal channel for the British Government's support for advanced research in the humanities. The Society was founded in 1972 as the Society for Afghan Studies, but its remit was extended to India, Pakistan and Sri Lanka in 1979. It aims to promote research in South Asian history, archaeology, art and related subjects.

Sannathi has much to offer the archaeologist, being almost completely undisturbed. It has evidence of many aspects of urban development from the Early Historical period, including a fortification and distinct zonal functionality. Around the city there are several Buddhist establishments, offering an insight into the relationship between the secular and the religious communities. This evidence is supported by a wealth of epigraphic and numismatic evidence from the Satavahana dynasty, and the intriguing possibility of the relationship between the Satavahanas and the Mauryas. It must be hoped that this first excavation leads to further intensive research at this most promising of sites.

We congratulate Mr. James Howell, Shri G. V. S. Rao, Dr. J. V. P. Rao and Mrs. Annie Howell on the completion of this report and give thanks to all their colleagues in the Hyderabad Circle of the Archaeological Survey of India who contributed to this project. We are delighted that it joins such a distinguished series of monographs as the Memoirs of the Archaeological Survey of India.

DAVID W. MACDOWALL
Chairman
Society for South Asian Studies

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EXCAVATIONS AT SANNATHI 1986-1989

CHAPTER I

INTRODUCTION

A. THE SITE AND ITS ENVIRONS

The site of Sannathi (Lat. 16° 49' 30"; Long. 76° 54' 20"), known also as Sonti or Sannati, is located on the eastern bank of the river Bhima about 60 km due south of Gulbarga (fig. 1). At this point the river makes an almost complete turn from its southerly course to flow northwards (*uttaravahini*), an auspicious situation marked by the location of a temple dedicated to the goddess Chandralamba, a Sakta diety. Although the present temple is of late medieval style, there is evidence, in the form of architectural elements, such as plinths (*adhisthanas*) and door-jambs (*dvarasakhas*), and in the mutilated life-sized Durga image, which suggest an early date to the Saivakshetra, which probably flourished during the Chalukyan and Nolamba periods.

Within the loop created by the river lie the remains of an early historic period city. Today, there are clearly visible on the surface the remains of a brick fortification (pl. I A) and of a raised inner citadel, on the point of the bend. In addition to this habitation site, there are also a number of other sites, located outside the city walls, the surface finds from which suggested that they were of Buddhist affiliation (M. Sheshadri 1965; P. B. Desai 1968). Two of these sites have previously been identified as stupas. Stupa 1, close to the river 0·5 km downstream from the Chandralamba temple, had been completely razed by local people. The circular base of the structure is now exposed on the surface, and a small portion of the outer casing of the drum remains intact. Columns standing in the field beside the mound suggest the presence of a vihara complex. Many relief slabs have been recovered from this site by various explorers. The second stupa mound is located 50 m to the north of the road, approximately 2 km from the modern village of Sannathi (pl. I B). The mound measured approximately 70 m in diameter by 8·5 m in height from the surrounding ground level. Small amounts of brickwork were visible on the surface of the mound, on the north-eastern side. During the exploration of the site a third stupa mound was identified 1 km north-east of Stupa 2.

B. PREVIOUS WORK

The ancient remains at Sannathi were first noted by Kapatral Krishna Rao, of Gulbarga in 1954. In 1964-65, a survey of the area was undertaken by M. Sheshadri, of the Department of Archaeology and Museums of the Government of Karnataka, after the site had been visited

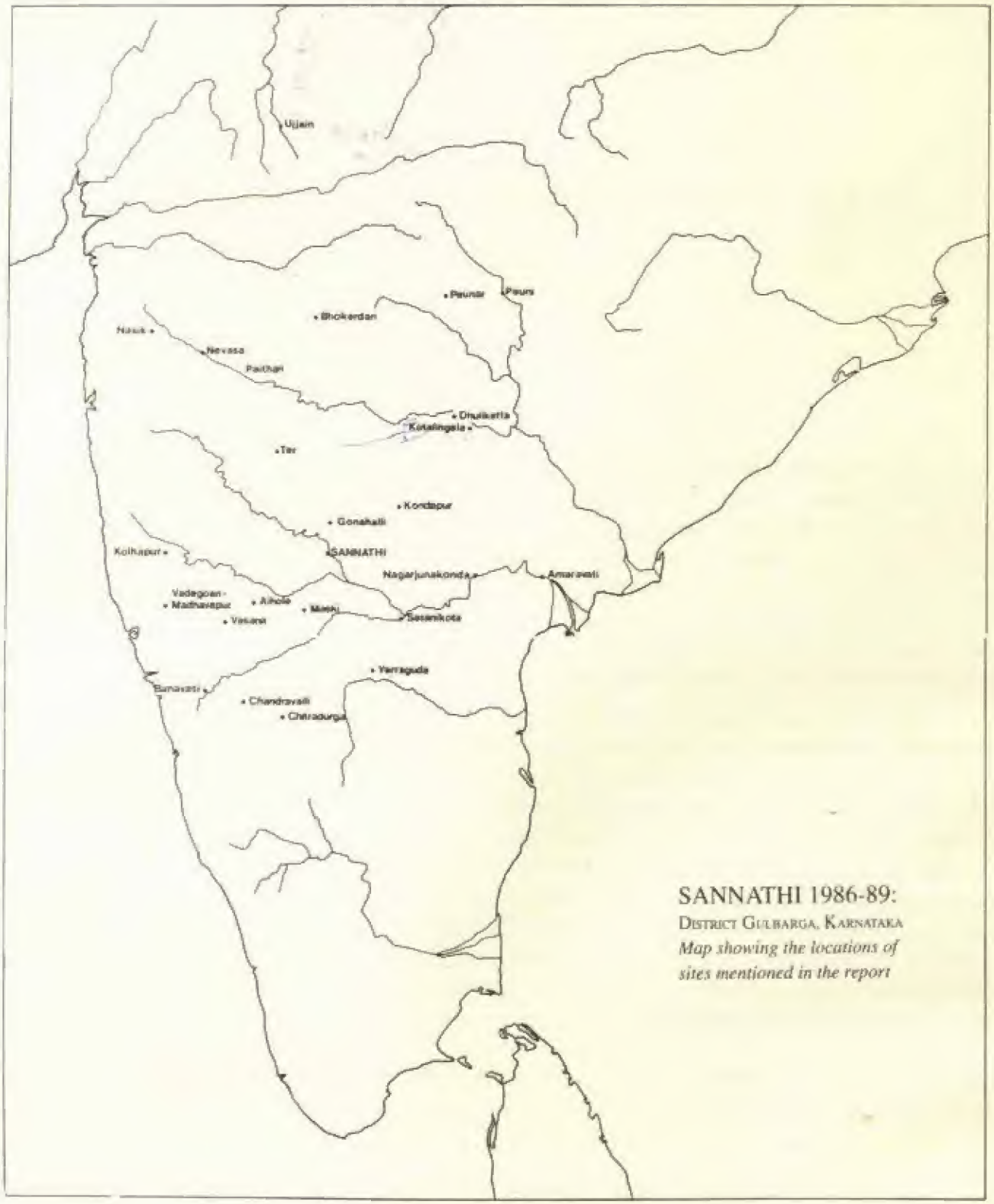


Fig. 1 : *Location of Sannathi*

by S. Nagaraju. This included the gathering of more than one hundred sculptures from the site, most of which are now in the State Government Museum in Gulbarga, and a collection of surface finds from the habitation site now in Mysore. This department's research at the site continued under the directorship of M.S. Nagaraja Rao.

In 1968, P.B. Desai of the Kannada Research Institute of the University of Karnataka, Dharwar, also carried out explorations at Sannathi. The author first visited the site in December 1985 and excavations at the second stupa mound, by the Archaeological Survey of India and the Society for South Asian Studies, began in November 1986. In 1986/87, A. Sundara, the then Director of Archaeology and Museums of the Government of Karnataka, opened excavations in the south west corner of the inner citadel area, known as Ranamandala (A. Sundara 1986-87).

Early indications were that the site belonged to the Satavahana period. An inscription mentioning "Rano Vasithiputasa siri-sata" had been discovered (G.S. Gai (ed) *A.R.I.E. 1966-67)*, which M.S. Nagaraja Rao (1985) attributed to Vasisthiputra Sri Satakarni. Lead coins of the Satavahanas were found on the surface throughout the area within the fortifications. In addition to this, double moulded terracotta figurines of the type usually associated with Satavahana sites had been found in plenty. Epigraphical evidence also supported this view from a chronological standpoint. In his review of the inscriptional material from Sannathi, Nagaraja Rao records "So far fifty-two inscriptions, many of which are fragmentary in character, have been found from this stupa site. Among these, three are in characters ascribable to the seventh century A.D. The others are in Brahmi characters of about the second century AD" (M.S. Nagaraja Rao 1985). This dating of the site was thrown into question by a chance discovery, in January 1989, by members of the Archaeological Survey of India. In renovation work on the Devi shrine, within the walls of the Chandralamba temple, an inscription was found which they identified as a part of the XII and XIV Rock Edicts and Separate Edicts I and II issued by the emperor Asoka (I.K. Sarma *et al* 1989 and 1990). It, therefore, seems likely that the original settlement at Sannathi dates from the Mauryan period (pl. II).

C. THE PRESENT STUDY

Three seasons of excavation work were carried out by the Archaeological Survey of India and the Society for South Asian Studies, between 1986 and 1989, at the second stupa mound (fig. 2). In the first season, work concentrated on the northern half of the mound. Several structural phases were recognised, around the base of the mound, including revetments to the drum wall, first in ashlar construction and subsequently in brick. A further structure was found to the north-east of the mound, in the form of a brick wall, cut through by a series of large post-holes. In addition to this, a deep cutting into the mound was started from the northern cardinal point, into the centre of the mound, and the fabric of the mound was found to be a deep deposit of small fragments of laminated limestone or shale, overlying a mixed core of shale and mud.

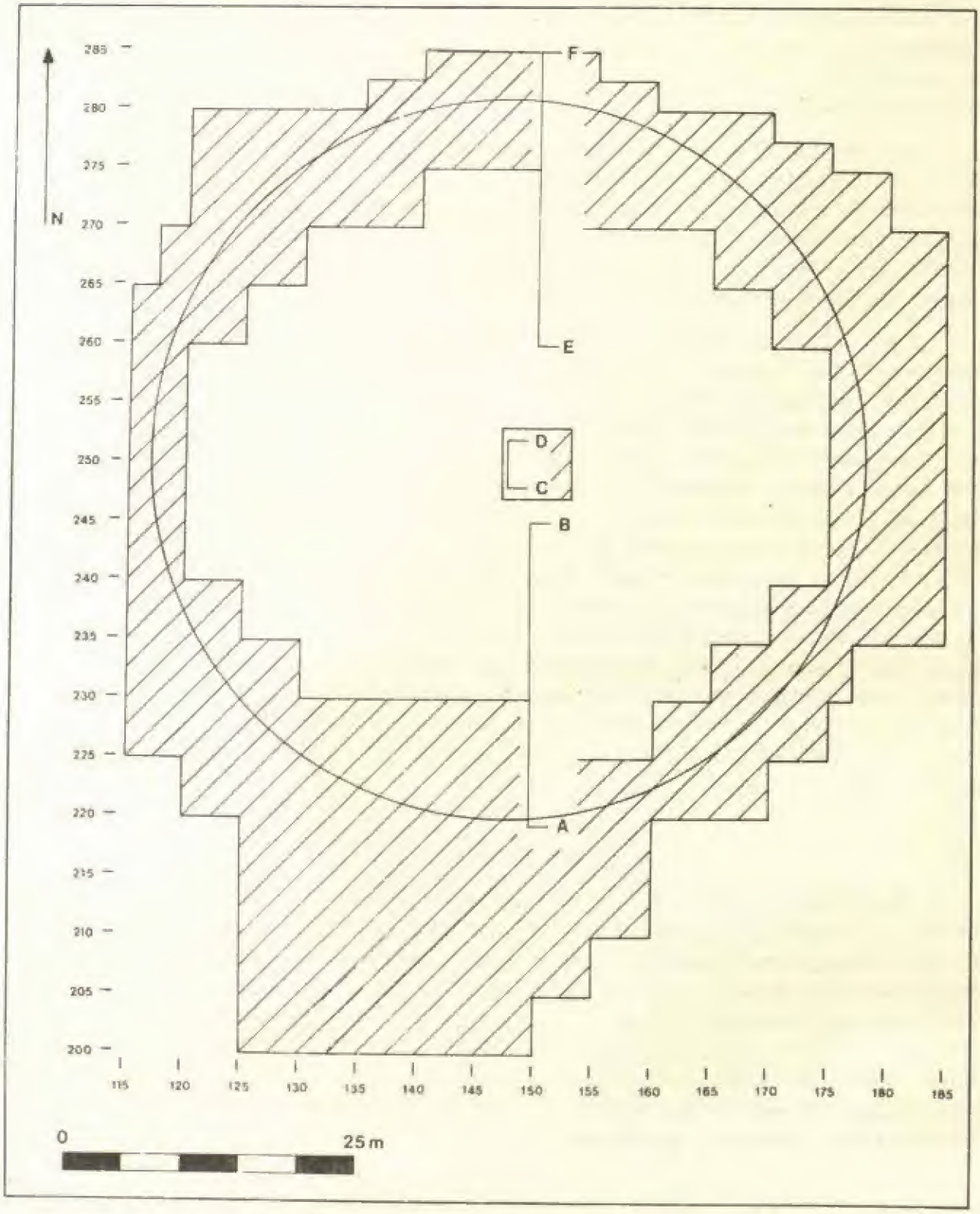


FIG. 2 : *excavated area with section locations*

During the second season of field work, the excavations were extended around the southern half of the mound, and therefore recorded all of the peripheral structures in plan. The major discovery of the second season was a large platform, applied to the southern side of the mound. The deep trench started in the first season was to be taken down to the undisturbed natural soil. At the top of the mound a large trench was to be taken up, and excavated right down to the natural bedrock to locate in plan any structural activity in the centre of the mound.

The third season saw the in-depth study of the platform at the south of the mound. Its full extent was traced, and its surface excavated to explore its function. Finally the transverse section through the mound was extended, from the centre to the northern cardinal point, to complete the section started during the earlier seasons.

D. ACKNOWLEDGEMENTS

On an international collaborative project of this nature there are many people involved who deserve thanks and credit. The Hyderabad Circle of the Archaeological Survey of India provided most of the staff for the excavation seasons. Thanks should go especially to Shri G.V. Sreenivasa Rao, Dr. D.Hanumantha Rao and Dr. S.V.P. Hallakatti who acted as co-directors during the three seasons. We were fortunate to have the active support and encouragement of two successive Superintending Archaeologists of the Hyderabad Circle, Dr. H.N. Singh and Shri A.P. Sagar.

Shri R.S. Kulkarni (Senior Technical Assistant) and Shri J. Vara Prasada Rao (Assistant Archaeologist) gave invaluable assistance both archaeologically and administratively in the field, and later during post-excavation work, when Shri J. Vara Prasada Rao contributed to this report. Annie Howell of the Society for South Asian Studies, who besides carrying out the conservation of the artefacts, meticulously ran the finds retrieval system, as well as making a valuable contribution to the process of excavation.

Sarvashri R.V. Sivasarma (Assistant Superintending Archaeologist); A. Sudesh, R. K. Dwivedi and T.C. Rathnam (Draughtsmen); A.Teerthe Nawali and I.V. Madhu Sarma (Surveyors); H. Gayasuddin and H.C. Thapliyal (Photographers); and R.R. Hegde also made important contributions to the project. Thanks should also be extended to the Attendants of the Hyderabad Circle of the ASI and to the drivers, labourers and inhabitants of Sannathi village, who supported our efforts throughtout the three field seasons.

Shri M.C. Joshi, the Director General of the ASI, and his three predecessors in the post, namely Shri Jagat Pati Joshi, Shri R.C. Tripathi and Dr. M.S. Nagaraja Rao all gave great encouragement and assistance throughout the process of negotiating and implementing the joint collaborative project. Dr. I.K. Sarma (Director) visited the site on numerous occasions, and was most free with his help, and especially with his great knowledge of the Satavahana dynasty. Thanks should also be extended to Shri K.G. Ragade, Superintending Archaeological Chemist, Southern Zone and his staff for allowing Annie Howell to use their facilities for the conservation of the antiquities and extending their full cooperation and support to her. Dr. B. M. Pande, Director (Publications) and

Shri C. Dorje, Superintending Archaeologist (Publications) deserve special credit for their determined efforts to bring out this volume.

In the United Kingdom, The Society for South Asian Studies, The British Academy, The Leverhulme Foundation and Fitzwilliam College, Cambridge have all supported the project financially and administratively. Especially thanks should go to Dr. David MacDowall, Robert Knox, Anthony Bennell and Sir Oliver Forster, the Chairman, Secretary and Treasurers of the Society for South Asian Studies respectively, who appointed me and have supported me totally since the beginning of the project in 1985.

Finally an immeasurable contribution has been made to the project by the British Council Division, of the British High Commission in New Delhi. The Ministers, John Hanson and Robert Arbuthnott, have freely given the full assistance of the Council, and conducted the negotiations on behalf of the Society for South Asian Studies with the Government of India and the Archaeological Survey of India. Perhaps the greatest contribution of all has been made by Mrs. Sushma Bahl, of the British Council, who has given constantly of her wisdom and who has guided me from my first day in India to this publication.

CHAPTER II

RECORDING SYSTEM

A. DOCUMENTATION

The principle aim of the recording system for an excavation is to enable the excavator to reconstruct the history of the site after he has disturbed it. The recording system must, therefore, be as full as possible, so that the archive contains all of the available material, even if it will not ultimately be used in the report. The Sannathi archive draws from four sources of information : the drawn record; the written documentation; the photographic record; and the preserved remains, architectural or artifactual.

1. The Drawn Record

(i) *The Site Grid*

The basis of the drawn record is the site grid. Before excavation a complete survey of the mound was undertaken. First the site was gridded from a basepoint to the south-west of the mound which was given the arbitrary value of 100/200. The first co-ordinate refers to the eastings, in metres from the basepoint and the second to the northings. This allowed the site to be expanded in any direction if the archaeological situation required it. The site was then subdivided into 5m grid squares, each of which is referred to by the easting and northing co-ordinate of its south-west corner. Within a grid square an individual location can be made simply by quoting its grid reference to whatever degree of accuracy is required.The advantage of this system is that a single pair of co-ordinates can lead one not only directly to the grid or trench, but also to an exact location within it. These grid squares each have their own series of plans throughout the excavation. Based upon this grid a complete contour survey of the area to be excavated was completed, a bench mark having been carried from the Chandralamba temple.

(ii) *Plans*

All plans of the site were drawn at a scale of 1 : 20, on a sheet measuring 25 cm × 25 cm, which represents a single 5m grid square. The co-ordinate of the grid-square (that is of is south-west corner) is recorded on the plan. Two types of plans have been drawn : detailed phase drawings of the entire site, made according to the interpretation of the Directors; and context plans of every individual deposit, fill, intrusion or architectural element.

(iii) *Sections*

A series of sections were drawn during the course of the excavations, along pre-arranged axes across the site. The most important of these is the section right through the centre of the mound, which shows us the way in which the mound has been constructed. In addition to these sections, profiles and elevations of individual features were also drawn, wherever considered necessary.

2. The Written Record

The written documentation of the site consists of a context recording sheets for each deposit excavated. The following information is required on the recording sheet :

a) The site code (SAN-1) and year of excavation.

b) The context number.

c) The grid co-ordinates, or location of the deposit on the site.

d) The name of the recorder and date.

e) A written description

f) Its stratigraphic relationships to contexts above, and eventually below it.

g) The finds and small finds found in it.

h) Cross-reference to drawings and photographs.

i) Interpretation of the context.

j) A sketch if it helps to make the information clearer.

The writtern description should cover all aspects of the deposit that have not been covered by the plans and photographs. This should be done systematically under the following headings : colour; percentage make-up of the soil matrix; any inclusions within the soil matrix giving their type, size and frequency; dimensions and regional variations within the deposit and the consistency.

In addition to this the supervisor should maintain a day book into which he should enter any notes and running interpretations that he might have about the context under excavation, or about the site in general. Conclusions about individual contexts should be added to the context recording sheets.

The final element of the written record is the site matrix of all stratigraphic relationships. This is compiled with the assistance of the context plans. Grid square by grid square, the plans of a context can be overlain by the plans of the already excavated material to discover which context or contexts sealed it stratigraphically. These relationships are recorded on a flow chart or matrix, which can represent the entire stratigraphy of the site on a single diagram. It enables stratigraphic conclusions to be drawn right across the site.

3. Photographic Record

Three types of photographs are taken of the excavations. Record photographs in both colour and black and white are taken to supplement the drawn and written records. Colour transparencies, or slides, can be taken to illustrate talks or lectures. Publication photographs of the site and of the finds are taken to illustrate the final published report.

B. EXCAVATION PROCEDURE

The excavation methodology is based on the principle of stratification of individual archaeological actions. Each separate deposit represents on archaeological action. The aim of the recording system should therefore be to record sufficient information about an individual deposit to allow the subsequent reconstruction of the entire history of the site. Stratigraphy does not only move downwards, as can be seen in a section through a site, but it can also move three dimensionally across the site. It is therefore of upmost importance to record the exact distribution of a deposit so as to be able to relate its position to that of other already excavated material.

The procedure for the excavation of individual deposits, or "contexts" was as follows:

1. The extent of the context is defined in plan, and its relationship checked with all surrounding deposits to make sure that it is completely unsealed, i.e. stratigraphically the latest unit on the site. In order to do this the deposit should be thoroughly cleaned.

2. If necessary the context is photographed. The photograph should be taken in such a way that it illuminates the reasons for identifying the context.

3. A plan of the context is made paying particular attention to the accurate plotting of the edges of the deposit, and any other significant details within it. A single deposit may have many plans. A separate plan is completed for every grid square that the deposit lies in.

4. The context is allocated the next number in a continuous sequence of numbers which should be maintained in a separate register. This number is simply a means of identification and does not indicate its position in the stratigraphic record.

5. The plans of the context are checked against the plans of the previously excavated material in each grid to see which other contexts it can be shown to predate. These relationships are recorded on the site matrix of stratigraphy, in such a way that the context number is linked, directly or indirectly to the bottom of every deposit that it has been proven to be earlier than.

6. Levels are recorded across the deposit in sufficient number to show topographical changes. The position and value of these levels is recorded on the plan.

7. A context recording sheet is filled in for the deposit, keeping objective description distinct from subjective interpretation. The context sheet is of a standard format, with spaces for the answering of specific questions, so that all the required data is given.

8. The excavation of the context can now be undertaken adding to the description on the context recording sheet, or annotating the plan, wherever necessary to adapt the information in the light of the excavation.

9. All finds from the context are kept separately grid by grid. Small finds, or finds of specific interest have a precise location recorded, and have a field small find number allocated. These are subsequently processed and accessioned if necessary.

C. FINDS STRATEGY

Although all finds should be treated in the same way, this is not always possible, as certain categories of finds, which are found in large numbers, are likely to overwhelm the recording system.These classes of finds need to be treated in a different way to the more rare types. There are therefore two categories of finds :

1. Small Finds

These finds are those that are considered to have a special importance to the interpretation of the site, or alternatively those that may require conservation or analysis.

On discovery, all small finds are removed from the site, having first recorded the context number from which they come and the grid co-ordinates at which they were found. These details should be recorded in the small finds register, from which the next field number should be allocated. The field number should be noted on the context sheet. Small finds are subsequently accessioned and given an accession number and card, on which they are carefully described and drawn. They should be assessed for conservation requirements and suitable storage conditions.

2. Bulk Finds

These generally occur in greater numbers and, although they are collected for future study and analysis, do not require such rigorous recovery methods, and will not be damaged as a result. Pottery and building materials are usually classed as bulk finds, as are animal bones when they occur in large numbers.

Bulk finds are kept separately for each context, and within that from each grid square from which they come. Pottery and tile fragments are the most usual types of bulk find. They are recorded quantitively and selectively drawn where necessary. They are stored by type for future analysis.

CHAPTER III

EXCAVATION

The second stupa at Sannathi lies about two kilometres north-east of the modern village, well outside the fortification. Close to the side of the road, the mound rises gently to a total height of 8·5m. above the surrounding area. The maximum diameter of the mound is 70m. A small amount of brickwork was protruding from the surface, at the base of the mound, on the north eastern side. The complete excavation of the mound was carried out in three field seasons, from 1986 to 1989 (see fig. 2 for the excavated area and for the location of sections). During the first season, the work concentrated on the northern half of the mound, with the remainder of the circumference being taken up in the second season. The second season brought to light a large platform applied to the south of the mound, and this became the focus of the third and final season. In addition to excavating the structural evidence around the base of the mound, over the three years a deep cutting was made into the core, following the north-south axis of the mound.

A. CENTRAL SECTIONAL CUTTING

Around the projected centrepoint of the mound an area measuring six metres square was taken up for excavation, with the intention of taking it right down to bedrock, and of recording in plan any structural activity that occurred in this vicinity. The cutting also provided a deep section through all of the make-up of the mound (fig. 3) and an area sufficiently large enough to sample artifactual material from successive deposits.

At a depth of 0·7m below the surface a circular feature was found cutting through the shale make-up, almost exactly at the centrepoint of the mound. Measuring 1·50m in diameter, and filled with black clayey-silt, the feature turned out to be very shallow, bottoming out after only 0·30m.

A deposit of lime or mortary material was found at a depth of 2·40m. This material was picked up first in section and later in plan, but appeared to be a random spread with no structural associations.

The rest of the deep trench produced little, other than the occasional small fragment of pottery or brick, supporting the theory that the mound is indeed completely man-made. It also showed the sequence of the build up of the mound to a total height of 9·50m above the natural bedrock, in a series of successive dumps of mud, shale and mixed deposits of the two. The core of the mound appears to be primarily of soil, whilst the later material is almost pure shale. At the very bottom of the trench and cutting into the natural bedrock was a small cut feature, possibly a post-hole, but there was nothing else within the area of the trench relating to it.

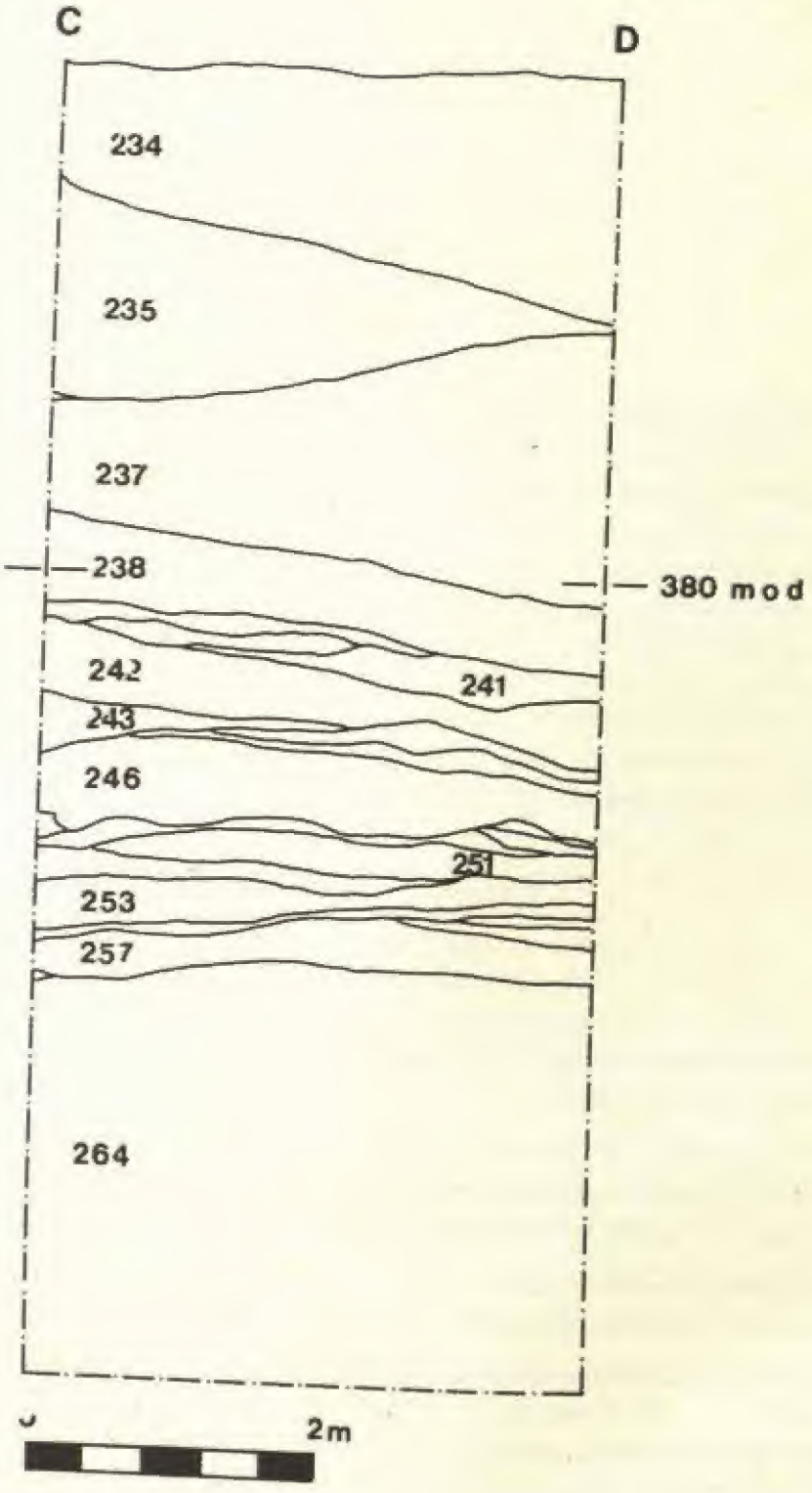


FIG. 3 : *Section through the centre of the mound*

B. DEEP TRANSECTIONAL CUTTING

The transectional cutting across the mound, stretched from the northern to the south cardinal points. The trenches were cut down to the level of the apparently undisturbed black cotton soil (pl. III). The resulting sections (see figs. 4 and 5) show clearly that the mound was built up in a series of dumps, from a mud core redeposited from the cutting of a large circular foundation trench which was cut, presumably to level the ground for construction. The lowermost layers are predominantly of black cotton soil, while towards the top of the section the make-up is almost exclusively shale.

In the section through the southern half of the mound (fig. 4), the brick wall at the back of the platform can be seen to be set into a cut in the side of the mound. The shale build-up dump for the platform itself (Context No. 346), is also in a stratigraphically later cut.

The northern section (fig. 5), demonstrates that the stone revetment wall (Context No. 61) is stratigraphically the earliest phase of the construction, on the periphery of the mound at the northern cardinal point. The stones at the base of the subsided structure can be seen to be running underneath the brick deposit associated with the brick rebuild of the drum wall (Context No. 51). The shallow cut (Context No. 203), excavated to level the ground before constructing the mound, is more pronounced on the northern side where the original ground level is almost 1·50 m higher than it is on the southern side.

C. PERIPHERAL EXCAVATIONS

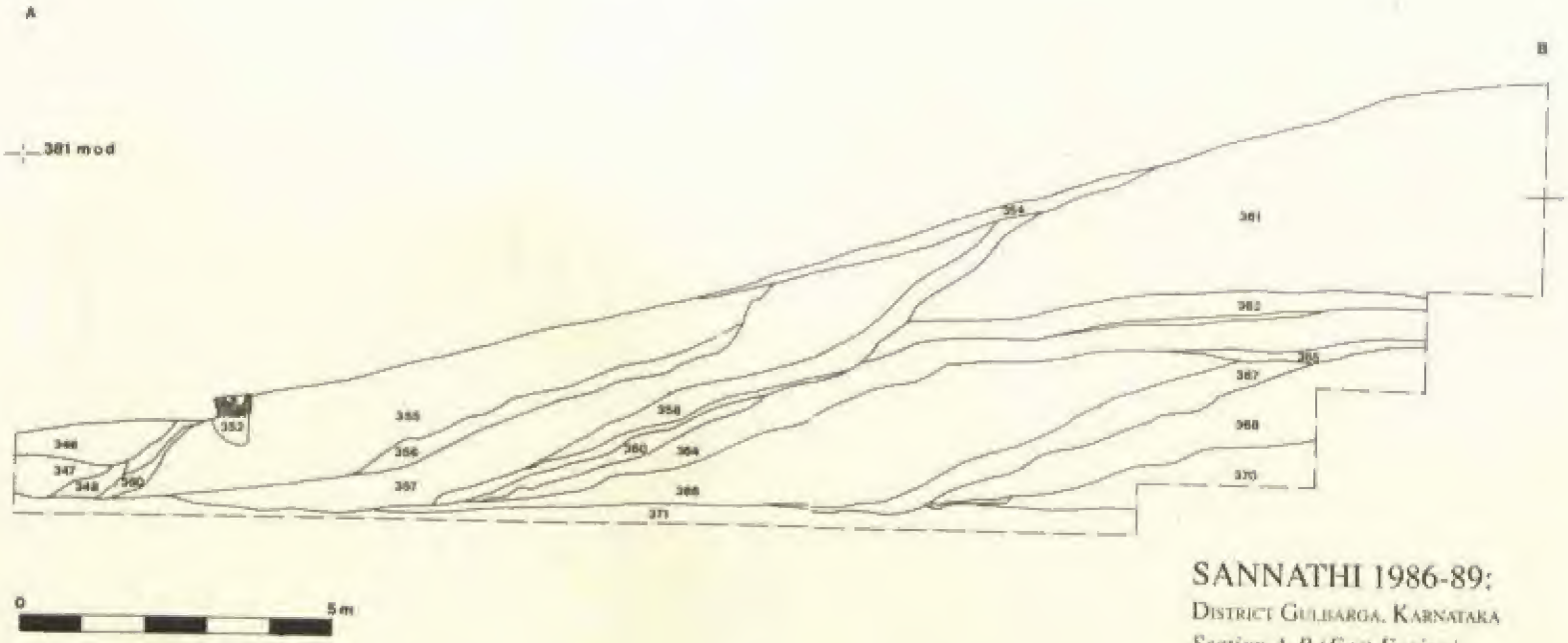
The excavated material can be divided into eight distinct phases discussed below from the earliest :

(i) Construction of the mound

Most of the evidence for the construction of the mound comes from the deep section cut through it. The ground around the site had been levelled by means of a large shallow cut, into the natural black cotton soil, the material from which was redeposited in the centre, to form the earthen core of the mound. Working from the centre outwards, a series of dumps were laid down. The dumps have two main constituents, the black cotton soil and limestone shale chips. At the core of the mound the dumps have a higher proportion of black soil, whilst higher up the material becomes pure shale. The dumps have also been interlaid with varying amounts of the two materials in successive deposits.

(ii) First construction in stone masonry

The earliest phase of construction at the mound is a stone revetment wall extending from the north cardinal point (pl. IVA), where it is sealed by the later brickwork, to the eastern cardinal point of the stupa (see fig. 6). Around its length it can be seen in various stages of disintegration. At the point where it is best preserved, twenty courses of stone work survive to a height of 1·60m. The stone blocks, from which it is constructed, vary in size and proportion, and hence there is no regular coursing, aside from the concentration of larger stones at the bottom of the wall. Although certain



SANNATHI 1986-89:
DISTRICT GULBARGA, KARNATAKA
Section A-B (East Facing)

FIG. 4

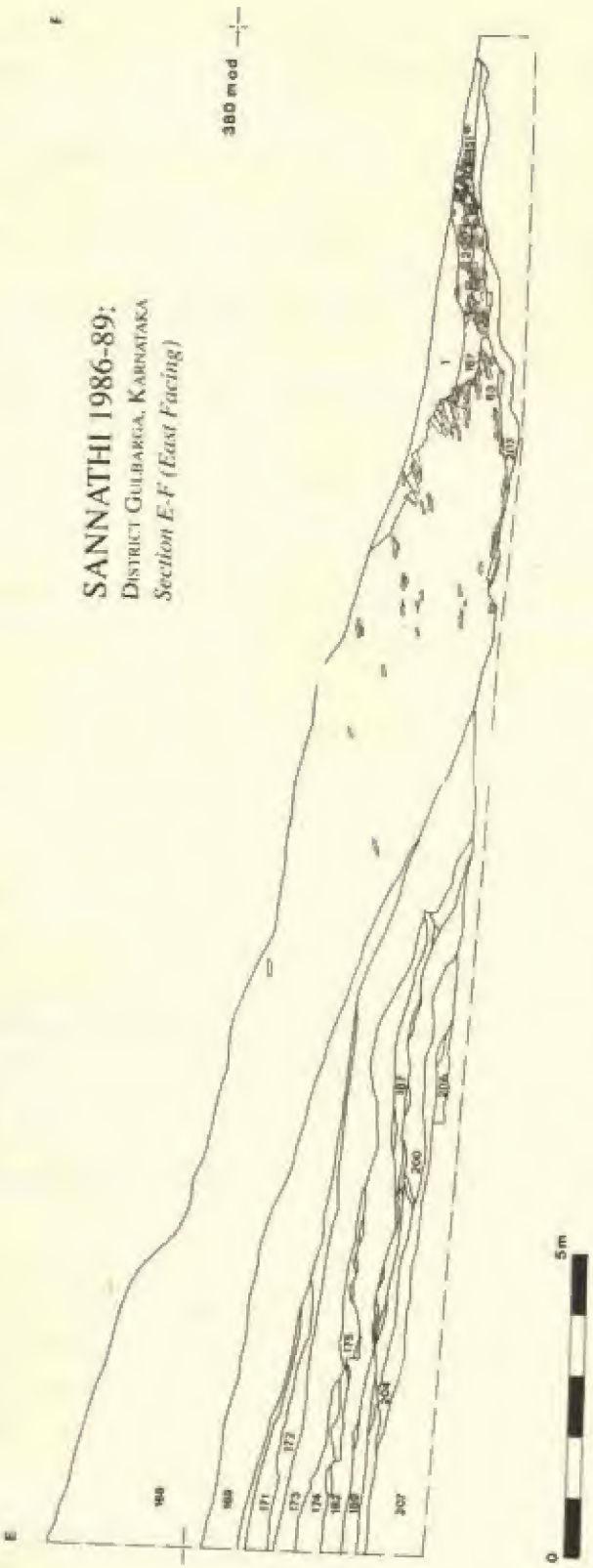

SANNATHI 1986-89:
DISTRICT GULBARGA, KARNATAKA
Section E-F (East Facing)
E
F
380 mod
5m
0

FIG. 5

areas of collapse could be identified there were comparatively few fallen stones around the wall, suggesting that unless there had been considerable robbing activity on the site, the wall never stood to a much greater height than was found.

In the extreme west of the site evidence of the foundation trench of this wall was found (pl. IV B). This is cut directly into the natural black soil of the area, supporting the hypothesis that this wall represents the earliest phase of the monuments construction. This construction trench was subsequently noted at the bottom of the deep section through the mound.

The natural soil, known locally as black cotton soil, has not been formed *in situ*, but has been transported by fluvial action to the lower lying areas. It has an enormous capacity to expand when wet, and similarly to contract when dry. Such movements may have been a contributory cause of the disintegration of the wall.

Before the insertion of the wall into the foundation hard core fill was placed into the construction cut. This consisted of densely packed limestone fragments, and may have been an attempt to consolidate the ground to avoid the problems associated with the plasticity of the black natural deposit. Evidence from the deep transect into the core of the mound suggests that the material from this foundation cut was mixed with the limestone chippings to form the mud core of the structure.

(iii) Peripheral brick structures at north-west

Several brick structures were identified, running concentrically around the stone revetment (see fig. 6). These are a series of fragmentary walls. Some run approximately parallel to the revetment wall, each having a slightly different alignment around the circumference (pl. V A). They are also not equidistant from the wall, but alternately set forward and back from it. Other wall fragments form returns linking these walls together.

Although the survival of these walls is very poor, being close to the surface and hence subject to plough damage, it is apparent that they have well faced exteriors, whilst the interior sides are unfaced. This suggests that they formed a series of projecting platforms around the periphery. No evidence of *ayaka* pillars, or their settings was found, but it seems likely that these would represent devotional or dedicatory platforms of some kind. It should be noted that an *ayaka* pillar recovered from the destroyed stupa is now in the State Government museum in Bangalore (M. Sheshadri, 1972, pl. 7).

It is possible that these platforms performed a similar function to the much larger and later platform found on the south side of the mound. If this is the case they may also have held memorial slabs, such as the one found close to the platform. Since a systematic robbing has occurred around the south side of the mound, it is not unlikely that any sculpted elements associated with these platforms has also been removed.

(iv) Rebuild in brick of the revetment wall

The north eastern side of the drum is encased in a brick revetment (pls. V B and XXXIII A),

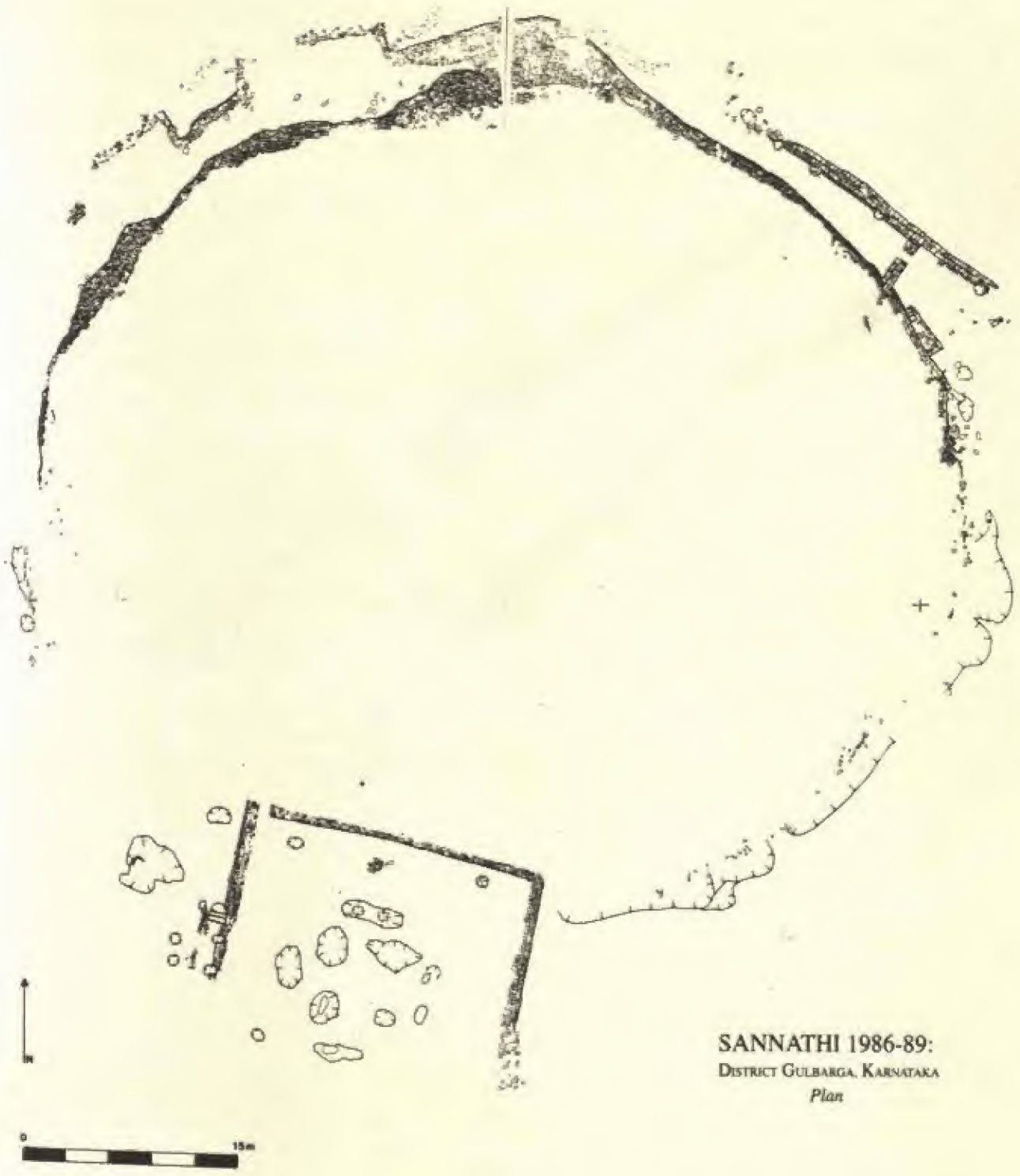


FIG. 6 : *Plan of the excavated remains*

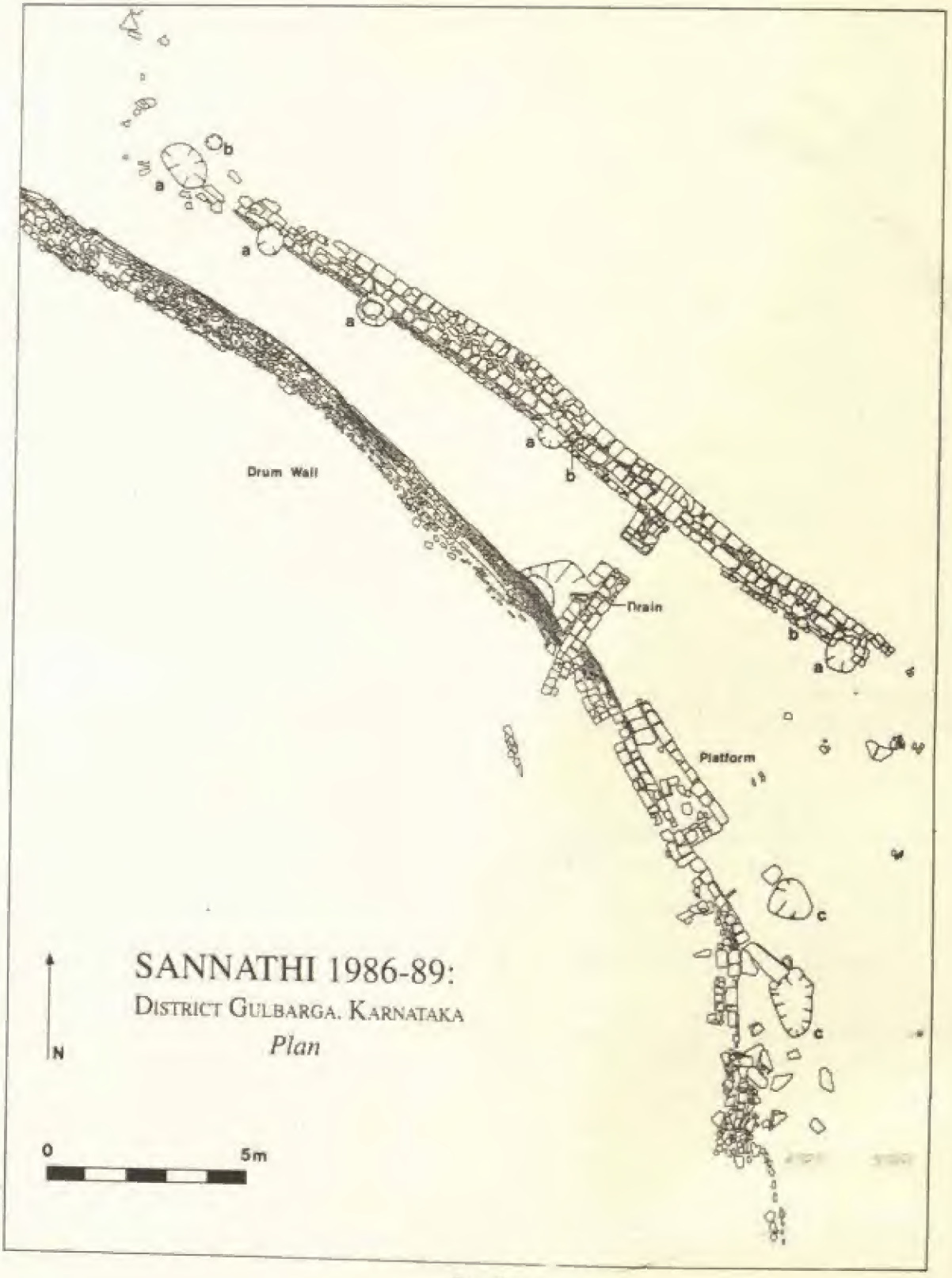

Drum Wall
Drain
Platform
SANNATHI 1986-89:
DISTRICT GULBARGA, KARNATAKA
Plan
N
0
5m

FIG. 7

coming to an end at the northern cardinal point where the stone wall emerges from beneath it. In section (see fig. 5) the stone wall can clearly be seen as the earlier of the two structures. One possible explanation for this phenomena is that the brick represents facing for the more roughly finished stone revetment wall. If this is the case the absence of the brick facing around the western side of the site must be explained. It is possible that it represents an unfinished facing operation. An alternative explanation is that it represents a later phase of construction, for some reason limited to the north-eastern side.

At the point where the stone revetment wall is sealed by the later brickwork, it has been substantially disturbed in a different way to the later disintegration which can be seen further to the west. The disturbance has occurred without the loss of entire courses of the wall, rather it has been subjected to subsidence as a result of the lower courses being forced outwards by the pressure of the unstable material behind them. This seems to suggest that the entire method of construction was unsatisfactory, and therefore in the area where the greatest disturbance had occurred the wall had been rebuilt in brickwork. Associated with this brick rebuild, is a small platform applied to the front of the wall (see fig. 7). It can be assumed to relate to this phase of construction, rather than to the later structures, because the brick drum wall has been constructed straight in this area to accommodate the structure implying that the intention to build the platform was there at the time of construction. The platform is reached by three steps, from the north (pl. VI A), at the base of which there is a small undecorated pillar which may represent a fragment of a stone balustrade, or a guard stone. The function of this platform is unclear, its narrow width suggests it was not a shrine applied to the front of the stupa, and no evidence remains of anything that it could have been an access to.

(v) Construction of a pillared structure

Outside the line of the drum wall, a second brick wall was found (see fig. 7; pl. VI B). The wall, which has been cut through by the series of post-holes, can be shown to be stratigraphically later than the brick drum wall. It may represent the formalisation of a *pradakshina patha* or circumambulatory passage associated with this phase of the stupa, but one might expect it to follow more precisely the curving line of the drum wall.

In total ten post-holes were found in two alignments which formed the northern and eastern edges of an area from which large quantities of tile were found. The post-holes can be divided into several types. The largest group (fig. 7, a), follow the alignment of the south side of the straight wall. Four of them are actually cut through the wall, while the fifth is in the same alignment but beyond the point, at its north western end, where the wall runs out. It should be pointed out that this wall was found just below the surface, and only survives to a maximum height of 0·25 m. It is therefore possible that the wall extended further to the north-west, but that all traces of it had been lost. A deep post-hole, cut through the wall, would still survive in these circumstances. The four post-holes in the wall all have similar dimensions, approximately 0·75 m in diameter, and one of them had pentagonal stylobate block in its bottom with brick packing around it (pl. V B). The columns that were sited in these foundations may have been very large, and supported a considerable load. This can be

suggested because there has been significant subsidence in the wall, at the points where it has been cut through by the post-holes.

The second group of post-holes follow the same alignment, but are much smaller, c. 0·2 m in diameter (fig. 7, b). Two of them are also cut into the wall but do not cut right through it. As with the first group there is another post-hole of a similar size beyond the north western end of the wall. They clearly do not have the load bearing capacity of the first group, but their adherence to the same alignment and their comparable stratigraphic position suggests that they must related, possibly in a less functional manner to the larger group.

The final group form a different alignment running north south and may represent the return of the edge of the structure to the south (fig. 7, c). They are slightly bigger, more irregular and not quite so deep. They are included with the other post-holes because their location coincides with the edge of a deposit of tile debris, which is associated with this structure. However, they do not form a perfect right angle with groups **a** and **b**, and could equally be interpreted as cut features which follow the alignment of the drum wall. As will be seen later, there has been considerable amount of cutting activity round the south eastern side of the mound, and on the platform to the south of it, which has been interpreted as the robbing. There is also evidence that standing memorials, in the form of pillars or slabs, may have been erected around the base of the mound. It is possible that these cuts could be robbing pits for such elements. Although it was uninscribed and undecorated, a well finished limestone block was found lying beside the southern one of these pits, which might have been a part of a sculpture, or structural element, that had been removed from the cut.

The distribution of the post-holes, and its spatial coincidence with a tile debris horizon suggests that the function of these post-holes was to support a roof. The absence of any similar evidence on the inside of the area in question may imply that the structure was a lean-to against the drum of the stupa, or that it covered the lower portion of the drum, and that the post-holes were cut into the drum itself and the evidence for them has vanished in the natural weathering process.

The area covered by this structure was also subjected to further change, namely the addition of a partition wall running north from the drum wall of the stupa, to the northern wall of the structure (see fig. 7). This addition may also relate to the post-hole structure, sub-dividing it into two sections. There is an entrance through this partition wall which would have allowed access between the rooms. Running under the partition wall is a drain, set at an angle to facilitate the flow of water from east to west (pl. VII A). The drain has been constructed of limestone slabs over which the wall has been built. The drain runs into pit against the drum wall, which may have functioned as a soak away.

The brick drum wall, and the later wall outside it were exposed with the removal of a large dump of disintegrated tile material. Upon excavation, this dump, though sealing both walls was found to respect their alignment. Since the presence of such high densities of tile were not found elsewhere on the site, it seemed likely that they represented a tiled roof over this area which measured about 50 square metres.

In order to test this hypothesis, a simple statistical analysis of the tile fragments was carried

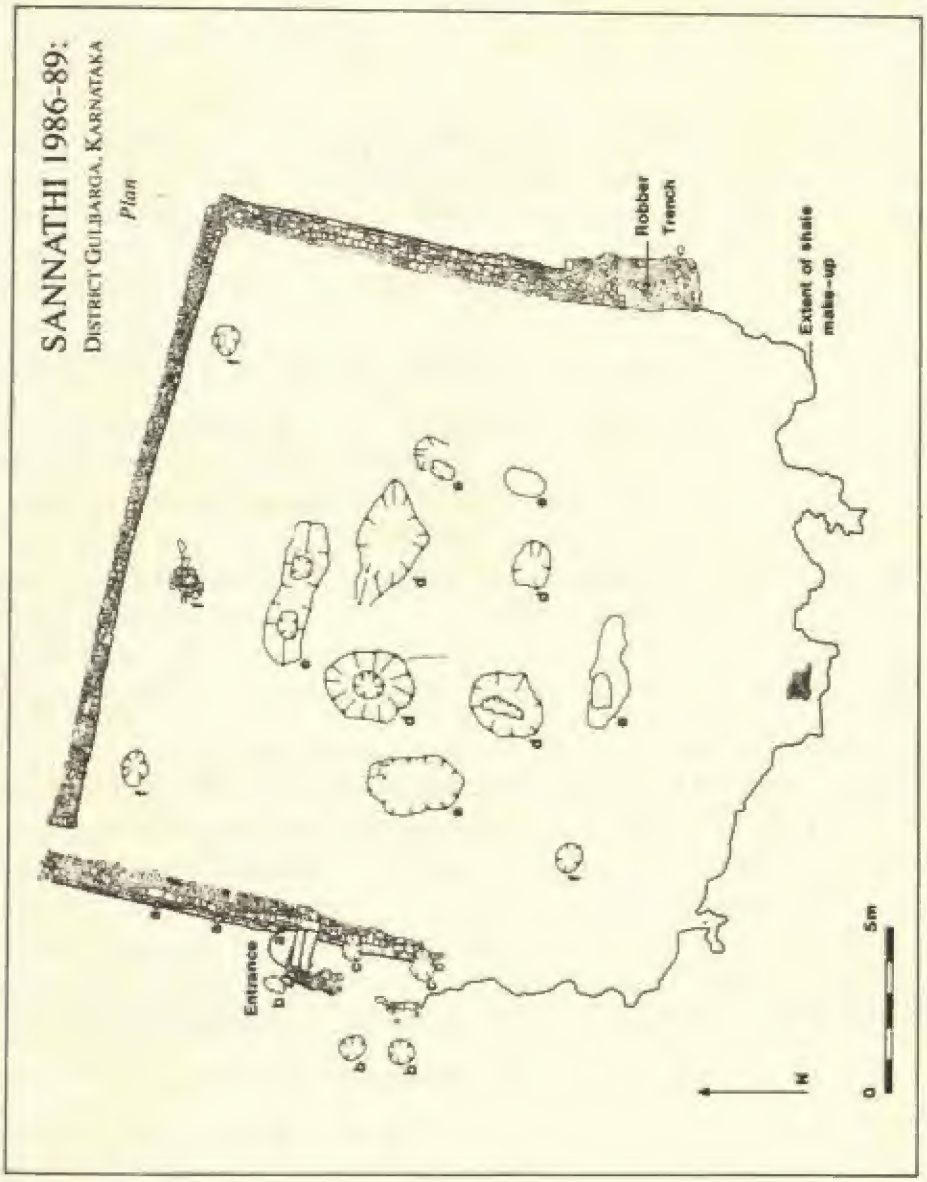


Fig. 8 : *platform at the south cardinal point*

out. In keeping with the recording system these tile fragments were collected, grid by grid, and subsequently sorted. All of the tile fragments were weighed and counted by grid square. In total this amounted to almost 19,000 fragments, weighing over 2,000 kg.

The largest fragments were separated from the rest, so that an attempt could be made to estimate the average size and weight of a single tile. From studying 800 of the larger fragments it was calculated that a single tile which measures on average 285 × 166 × 30 mm would weigh approximately 1.1 kg.

Some of the fragments were found to have the remains of nail or peg holes in them. Complete or near complete tiles were found to have two holes 55 mm in from their top edge. Only very few iron nails were found in the area associated with these tile deposits, and those found had such small heads that they would have passed right through the holes in the tiles which had a diameter of 15-25 mm. The scarce distribution of iron nails suggests that some other material may have been used to hold the tiles on the rafters, possibly wooden pegs. The number of fragments with peg holes was also recorded as an additional estimate for the possible total number of tiles recovered.

Each tile was found to have four incised grooves running lengthwise down it ending at the bottom edge of the tile. The grooves measure on average 150 mm in length. It can be assumed that these were to facilitate the run off of rain water. The area covered by the grooves probably also relates to the area of the tile that would be exposed in a portion of roofing. The left hand side of a tile has pronounced ridge running the entire length of the upper surface, whilst there is a groove of similar dimensions, that would accomodate it, running down the right hand edge of the tile on its underside. This suggests that, in a portion of roofing each tile was laid overlapping the one to the right, with the groove in its right hand underside fitting over the ridge on the left hand side of its neighbour.

Based upon this evidence it is possible to reconstruct an area of tiles roofing, using the more complete tile fragments (pl. VII B). Successive courses of tiles, which may have been offset from one another, would overlie the lower course to such an extent to expose only the portion of the tile with the run off rills on it. From this reconstruction the exact area of tile that was exposed in a roof could be measured. This was found to be approximately 140 × 140 mm or 0·0196 sq m. It was therefore calculated that the tile material from the two dumps, was sufficient to roof an area of 41 sq m. This figure represents the minimum area that could have been roofed, since it is possible that some of the tile from the disintegrated roof may not have been redeposited *in situ*.

(vi) The platform at the south cardinal point

The first evidence of a platform at the south side of the mound was a low wall constructed over the core of the stupa separating the back of the platform from the body of the mound, which is only faced on its southern edge (see fig. 8; pls. VIII A and XXXIV A). Returning to the south, from each end of this wall are two further walls, again built up over the mound (pls. VIII B and IX A). In these two cases the walls are only faced on their outer edges, and act as retaining walls to a make-up dump of shale fragments, which raise the level of the centre of the platform. Unlike the core of the mound this material has been regularly and horizontally laid (pl. IX B). The outer faces of the east

and west walls are decorated with a series of offset, and quarter round moulded courses. Both of these walls have disintegrated towards the south, and there is evidence that the east wall was partially robbed away at a later date.

The southern wall of the platform has almost completely disappeared. A single course of brickwork, extending for less than a metre is all that survives. However the extent of the platform was traced through the survival of the shale dump that filled it. Unlike the core of the stupa, which was irregularly dumped, the make-up of the platform is very regular in both size of fragment and bedding. It was therefore possible to remove all of the material that had slumped down the slope, or been disturbed during robbing. The alignment of the end of the regular shale make-up, corresponded closely with the few surviving fragments of brickwork. From this it is clear that the platform is square.

The platform is reached from the west by an entrance, applied to the face of the retaining wall, half way along its length (pl. XXXIV B). This entrance takes the form of a smaller platform ascended from the north by a flight of two limestone steps. At the base of these steps there is a moonstone and at its western side a guardstone. There is also evidence that the entrance may have been roofed over. This is found in the form of three post-holes cut into the west wall of the platform (fig. 8, a), three post-holes to the west of the structure (fig. 8, b), and two larger ones cut into the entrance platform (fig. 8, c). There was also a great deal of tile debris in the deposit that sealed the moonstone and lower most step.

Although the surface of the platform was very disturbed, there were a series of cut features, which might give an indication to the function of the platform. In the very centre of the platform was a group of four large cuts (fig. 8, d). These probably represent the robbing out of the main feature of the platform. The excavation of two of these cuts revealed clear features in the bottom, which suggest that a large slab might have been set in them (pl. X A). The dimensions of these foundation cuts are very similar to the dimensions of the memorial slabs, commonly found at Sannathi. They also imply that if such slabs were in place on the platform, almost one metre of them would have been below surface level. A fragment of such a piece, found to the west of the platform, and another complete sculpture in the Karnataka State Museum at Gulbarga, attest the fact that the sculptures often had blank sections of upto and over a metre at the bottom.

Around these foundations were another series of cut features (fig. 8, e). These were longditudinal cuts, with deeper circular sections at each end (pl. X B). They may represent double post -holes (pl. XI A) for some form of canopy over the assembly of memorial stones. A number of other cut features, and an area of densely packed bricks and stones were found round the edge of the platform (fig. 8, f). Although these were much smaller than the cuts in the centre, the ones at the back of the platform, where it survives to its greatest height, were found to be very deep. This again implies that whatever once stood at that point, was both heavy and tall.

The function of this platform is unclear, though it seems to have been built to accommodate a series of memorial stones (pl. XII A). It may represent some element of a vihara complex associated with the stupa or possibly later embellishment to the stupa itself. The extent of the intrusive activity

around the drum, which may represent comprehensive robbing activity, means that there is little surviving material with which the platform can associate.

On the northern side of the stupa there were several phases of structural activity, but none that can be directly or stratigraphically linked to this platform. Its construction over the core of the mound, indicates that it does not belong to the earliest phase, the stone wall running around the north-west side of the mound. The usage of similar building material may however link it with the later structures, the brick rebuild of the drum wall, or the later pillared structure to the north-east. The retaining walls of the platform have been built with bricks measuring 50 × 25 × 7 cm, similar to those used in the drum wall rebuild, whereas the pillared structure seems to have been constructed of bricks of less regular size, suggesting that they may have been re-used from elsewhere. However there are also some bricks of smaller size in the walls associated with the moonstone entrance to the platform entrance, though this may mean that the entrance does not belong to the original phase of construction of the platform.

The platform has yielded several coins and as such is probably the most easily dated phase of the occupation of the mound. Coins of Satakarni I, Satakarni II were found on the surface of the platform, though their exact stratigraphic locations suggest that the coin of Satakarni I is residual. It comes from a deposit which has a *terminus post quem* established by the coins of Satakarni II. In the deposits sealing the platform, and probably representing its disuse, a coin of Pulumavi I was discovered. This may lead us to the conclusion that the platform is broadly speaking, contemporary to Satakarni II.

(vii) Cutting activity around the drum wall

During the later occupation of the site, after the construction of the platform, a number of cuts were made following the circumference of the mound. In different places these cuts took various forms. At the east and south-east sides of the site the cuts are almost semi-circular in plan, but around the south, and running up to the platform these have run together to form a trench with an undulating bottom. The cuts are later than the platform, stopping at the east wall, but a similar cut is again found to the west of the platform. In places these have intruded right into the shale core and have removed all relationship between it and the surrounding material. The purpose of these cuts is not clear, though they presumably relate to the destruction phase of the site. One possible indicator to their funcion may be the presence of a pair of large sculpted fragments, discovered in the south-west of the site (pl. XI B).

These two fragments are the only sculptures discovered at the stupa site during three seasons of excavation work. They may be part of the same piece, since one is clearly the bottom of a larger fragment, the remainder of which may be represented by the second. The first fragment, which measures 1·31m in height by 0·60 m in width is almost completely undecorated, except for the very top which portrays a pair of human legs at the extreme left and a series of undefinable lower limbs at the right (pl. XII B).

The second panel, measuring 1·07 m in height by 0·60 m in width, which is fully decorated,

portrays two scenes set one above the other and divided by an inscription. The label inscription reads *amachaputasa siyadatasa* referring to Siyadatta, the son of Amachya who belongs to a royal family. The upper portion shows seated couple flanked on either side by female attendants. The lower depiction, is of a horse, being led by a groom and preceded by an attendant carrying an umbrella. There are two possible interpretations for this scene. The first refers to the similarity between this depiction and another common scene from the sculptures from Sannathi, which portrays an unyoked bullock cart. This bullock cart is commonly thought to represent the end of a journey, in this case the journey though life of the person or persons depicted in the upper half of the panel, whose names may be recorded in an inscription. These panels would therefore be memorials, erected to people after their death. The unridden horse in this example may be interpreted similarly. The second possibility is that this may be a scene from the Lord Buddha's renunciation, depicting his horse Kanthaka, and groom Chandaka. This panel is similar to another sculpture found close to Stupa 1 and now incorporated into the wall of a small Durga shrine.

The presence of these two sculptures suggests that the stupa is not completely aniconic and that there might have been more sculpture at the site. If this is the case it would be reasonable to expect to find such sculptures around the circumference of the stupa. A possible explanation for the series of cut features recorded around the base of the mound may therefore be a systematic robbing of such pieces, and their removal from the site. The fact that a broken fragment was not removed suggests that such a robbing was not simply in search of building material, but in order to reuse the material, in a similar context at another site.

(viii) Late intrusive activity and natural weathering

In several cases late intrusive cuts had truncated the underlying archaeology. Most of these were found to associate with the old road, that skirted the east side of the mound, or the modern field boundary. Each was identified and removed in sratigraphical sequence before the excavation moved on to the material below.

The weathering of the stupa mound, the final phase detected stratigraphically is represented by context 1, or the site overburden. All of the intact stratigraphy is sealed by a homogenous dump of disintegrated shale fragments and natural soil build-up, has been thoroughly mixed by successive years of ploughing, traces of which could still be detected in the surface of the intact stratigraphy below. The origin of the shale in this material seems to be the upper portion of the core of the mound, suggesting that in the final period of destruction, material from the top of the mound has slumped down to seal the stratified deposits and structures around the circumference.

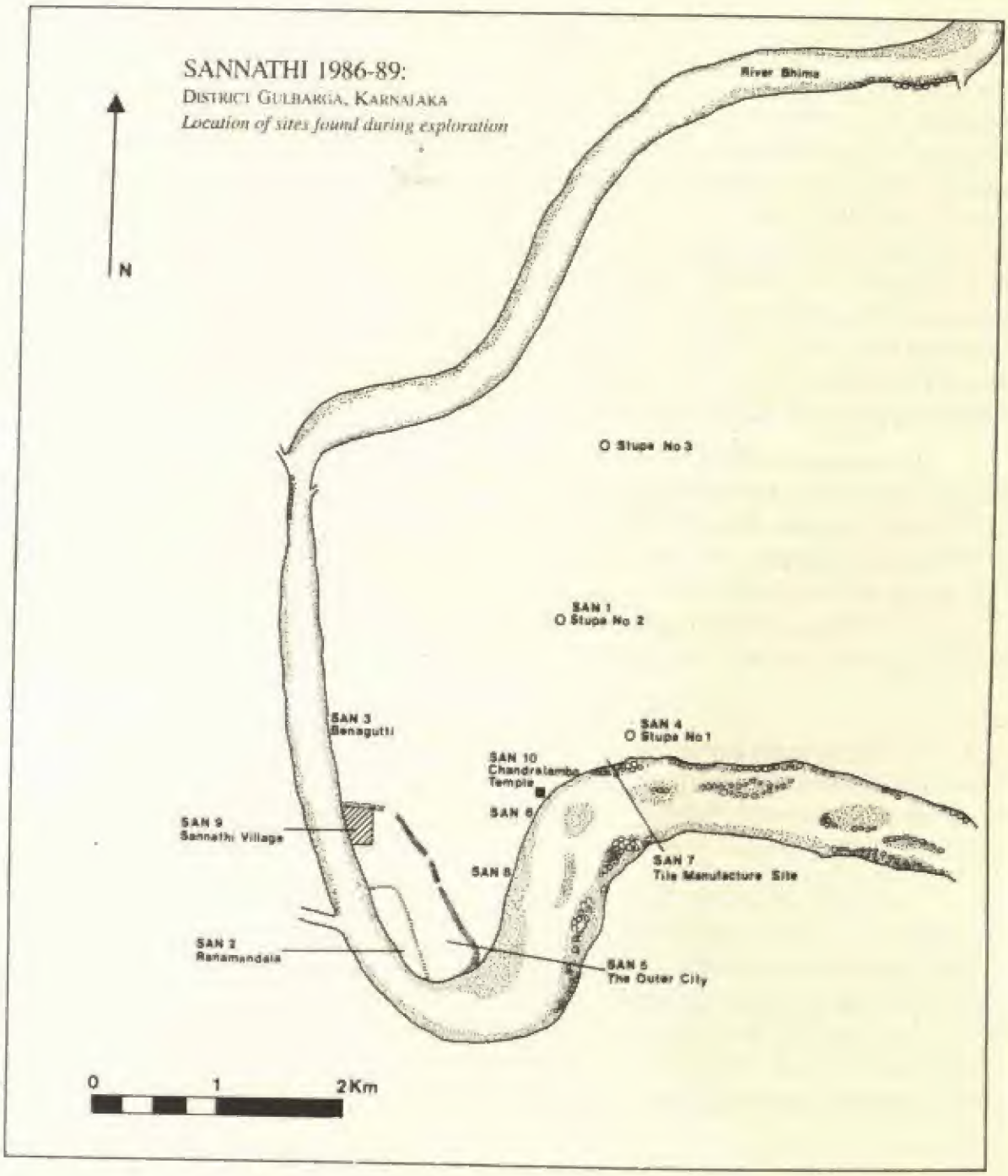


FIG. 9 : *Location of sites found during exploration*

CHAPTER IV

EXPLORATION

Explorations were carried out during the three seasons of excavation, to add to the information gathered about the site. Some of the sites visited had extremely rich surface collections of pottery, but this was not collected in order not to denude the site, and so that a future date a more systematic study of the distribution of pottery types might be carried out. The distribution and density of this pottery may give valuable clues to the nature of the settlement in areas where excavation is not possible. It is hoped that study of this material can be made at a future date.

In order to record the location of antiquities recovered, a series of site numbers were allocated, as finds were recovered from them (fig. 9). This also enabled them to be distinguished from those recovered from the excavation site. All site numbers carry the prefix SAN-. The site numbers allocated are as follows:—

SAN-1 Stupa 2 Excavation site
SAN-2 The inner citadel (Ranamandala)
SAN-3 Monastic complex (Benagutti)
SAN-4 Stupa 1 and associated monastic complex
SAN-5 The outer city
SAN-6 Area around the Chandralamba temple
SAN-7 Tile manufacture site
SAN-8 Occupied mound south of Chandralamba temple
SAN-9 Sannathi village
SAN-10 Chandralamba temple

A. THE CITY SITE

(i) The Fortification

Known locally as *Seturajanakatte*, the outer fortification encloses an area of 86 hectares, at the point of the bend in the river. The fortification survives today to a height of 4 m, and has several breeches along its length, which may correspond to the ancient gateways. Where the top of the fortification has been eroded it is possible to see the brick structure within (pl. XIII A). At regular intervals along its length there are areas where the wall is thicker and in these places right angled returns of the wall, both outwards and inwards can be made out. These may be square watch towers

or bastions. Where it has been cut into, the wall can be seen to be constructed of large, Satavahana style bricks.

The name *Seturajanakatte* has been interpreted differently by various scholars. K.V.Ramesh (M.S. Nagaraja Rao 1985) thought it was a corruption of Satavahana Kote, whilst I.K. Sarma (1990) argues that it refers to a king named Setu who tried to molest Chandralamba and died by her curse.

(ii) The Inner Citadel

The elevated area known as Ranamandala (SAN-2), covering 25 hectares represents the inner citadel of the city (pl. XIII B), and shows the highest density of surface finds including twenty-four lead die struck coins of the Satavahana kings Kumara Satavahana, Satakarni II and either Gautamiputra Satakarni or Vasisthiputra Satakarni. There are also six copper-alloy coins of similar date. A single silver punch marked coin supports the evidence of the Asokan Edict that there may be an earlier Mauryan phase at the site. Terracotta figurines, beads, bangle fragments and a vast array of pottery have been found (M. Sheshadri 1972). It was on the edge of this area, overlooking the river, that A. Sundara, the Directorate of Archaeology and Museums of Karnataka, undertook excavations in 1986/87 (A. Sundara 1986/87). He discovered a massively constructed building, surviving to a height of almost four metres. An interesting feature of the building was the comparatively small size of the internal rooms and corridor. Situated as it is above the banks of the river, it might have formed a part of the river front fortifications.

(iii) The Outer City

The outer or lower city (SAN-5), covers an area of almost sixty hectares between Ranamandal and the fortification wall (pl. XIV A). Although no structures can be made out on the surface there is clear evidence of habitation from the amounts of artefactual material spread right across the area.

B. OCCUPIED MOUND SOUTH OF THE TEMPLE

In the fields between the Chandralamba temple and the fortification there is raised area (SAN-8), very rich in surface finds, especially pottery. This may be a habitation or occupation site outside the city wall. One of the most important sculptures from Sannathi was found at this site (I.K. Sarma and J.V.P. Rao 1990). The panel is broken, but shows the backs of seven kneeling females, with ornate hairstyles (pl. XIV B). They are possibly paying homage to the main figure, which is unfortunately missing. An inscription however identifies him as Gautamiputra Satakarni, and records his conquests. His status is also attested by the procession of horses and elephants depicted in broken portion of the panel.

C. RELIGIOUS STRUCTURES

(i) Stupa 1 and associated Monastic Complex

The remains of the first stupa identified at Sannathi (SAN-4) lie close to the river bank approximately 1·5 km down stream from the city site. The circular foundation of the stupa, which is all that survives today, indicates that the structure had a solid dome faced in ashlar blocks, and an

overall diameter of approximately 25 m (pl. XV A). It was surrounded by an elevated *pradakshinapatha*, the paving of which still survives in places. Many of the sculpted relief panels, which are now in the State Government Museum in Gulbarga, were recovered from this site.

Close to the stupa is a small Durga shrine around a tree, which incorporates many sculptures in its rough construction. A relief panel very similar to the one discovered from the excavations at the second stupa is reused in its wall (pl. XV B). As with the sculpture found from the excavation, the bottom panel of this slab shows an unridden horse being led by a groom. Absent in this case is the attendant leading the procession carrying an umbrella. The riderless horse, in the bottom panel of a memorial stone, is less common than the unyoked bullock cart. However their comparable interpretations are supported by an unpublished sculpture in the State Government Museum in Gulbarga, with portrays both the horse and the unyoked bullock cart in the same panel.

The broken tops of several undecorated pillars are still standing in the field, just to the south of the stupa mound (pl. XVI A). Though some of the pillars are either missing or still buried, they appear to be in four lines, each of four pillars. It therefore seems likely that they may represent the remains of a sixteen pillared *mandapa*, and that associated with this stupa is a monastic establishment.

(ii) Stupa 3

This mound, not quite as large as Stupa 2 (pl.XXXIII B), lies 3·5 km north-east of the city (pl. XVI B). There are no sculptures, or other indications, on the surface but its similarity to Stupa 2 suggests that this must also be a stupa mound.

(iii) Monastic Complex

On the river bank upstream from the city is another group of buildings on a low mound known as Benagutti (SAN-3), this literally means "mound of stones", though it seems more likely that the name derives from *Benakappagutti*, relating to the Chalukyan period figure of Ganesa in black granite located in the field close by (pl. XVII A). The brick structures of this complex have recently been exposed by local people in order to dismantle them for building material. To date most of the damage has been the removal of the fallen bricks around and within the structures rather than the walls themselves, which can now be seen standing to a height of 0·8 m in places (pl. XVII B). The structures are small cell like rooms, often with interconnecting doorways.

(iv) Area around the Chandralamba temple

Most of the fragments of sculpture found during the explorations came from the area immediately around the temple (SAN-6). In most cases it is clear that they were not found *in situ*, but have been gathered from the locality in order to build terrace walls to stabilise the platform upon which the temple sits. However there is evidence of ancient structures at the site on the far side of the rain gully between the temple and the PWD inspection bungalow. Exposed on the surface is the top of a brick wall, once again constructed of Satavahana bricks.

D. OTHER SITES

(i) The Chandralamba temple

Several sculptures have been recovered at various times and have been set up within the precinct of the Chandralamba temple (SAN-10). The most important of these stands on a plinth, under a tree, in front of the main entrance to the temple. It depicts a *Buddhapada*, in front of a chair, under a tree (pl. XVIII A). It clearly represents the enlightenment of the Buddha, and as such is primary evidence of Hinayana Buddhism at Sannathi.

In the course of the 1988-89 excavation season extensive repairs and renovations were being made to the Chandralamba temple. Amongst these was the dismantling of an old Devi shrine, adjacent to the main temple building, in order to replace the old broken image of Chamunda. During this work, members of the Archaeological Survey's team at Sannathi, Shri R.V.Siva Sarma and Shri J. Vara Prasada Rao, noticed that the slab, into which the old image was fitted, was inscribed. The inscription proved to be an Asokan Rock Edict. The Edicts on the slab were not complete, but clearly formed parts of the XIIth and XIVth Edicts of Asoka. On removing the slab it was found to have further inscriptions on its reverse. Once again it had been damaged, presumably at the time of transplantation, but these were identified as the special Rock Edicts, known as the Kalinga Edicts. Most of the first edict is off the slab, but much of the second survives. These discoveries suggest that it was a free standing slab, inscribed on both sides, and as such it is unique find. The details of the discovery have been discussed in great detail elewhere (I.K. Sarma *et al.*, 1989 and 1990; K.V. Ramesh 1991), but its implications cannot be ignored. While the material from the excavation of the second stupa suggests Satavahana dating to the site, the presence of the edict confirms that the city must have had its origins in Mauryan times.

(ii) Tile manufacture site

Located right on the river bank close to Stupa 1, is a site which may represent a tile production area (SAN-7). There is a large built-up platform upon which there is evidence of neatly arranged stacks of tiles, similar to those found in the excavation. In many cases these tiles have become fused together, and are often heavily oxidised. They might therefore be the tiles that were fired at the edges of a kiln and therefore have been discarded. If the excavation of this site produced the remains of a tile kiln it would render valuable information about the technology and development of this industry.

(iii) Bathing Ghats

Two ancient bathing *ghats* have been found during explorations round Sannathi. The first lies on the left bank of the Bhima, close to Stupa 1 and the tile manufacture site, whilst the second is located on the far bank of the river, opposite the Ranamandal mound (pl. XVIII B).

CHAPTER V

POTTERY

A. INTRODUCTION

The pottery discussed in this chapter comes solely from the excavations of the second stupa. During explorations in the environs of Sannathi numerous scatters of ancient pottery were found but these were not collected, so as not to denude the site further. The surface collection will provide valuable evidence if studied systematically, but this will be a great undertaking in itself. The greatest concentrations are in the Ranamandala (SAN-1) and Benagutti (SAN-3) areas, and on the mound to the south of the Chandralamba temple and PWD Inspection Bungalow (SAN-8). Less dense scatters can be found in the outer city (SAN-5) and around the destroyed stupa close to the river (SAN-4). In the Ranamandala area A. Sundara recovered sherds of Russet Coated White Painted Ware and of Rouletted Ware, but neither of these types were recovered from the excavation of the second stupa (A. Sundara 1986/87).

The majority of the pottery from the excavations is red ware, which can be sub-divided into three categories: coarse red ware, slipped red ware and burnished red ware. The three other types are red polished ware, black and red ware and black ware. The red polished ware and the black ware were found in considerably lower proportions to the four other types of pottery. In addition to these a small quantity of medieval grey ware was found in the robber trench of the east wall of the platform (Context 70), which confirmed its interpretation.

B. RED POLISHED WARE

Red polished ware is often considered as one of the typical fine wares of the early historical period, occurring frequently in western India. The greatest concentration of red polished ware sites is in Saurashtra, which forms a part of Gujarat. Amreli, excavated by S.R. Rao in 1952-3, has produced sixty three different types, including forty jars and nine bowls, but the most common form associated with the ware is the sprinkler (S.R. Rao 1966). The red polished ware has occasionally been cited as evidence for contact with the Roman Empire, as result of the similarity between it and Arretine ware. The appearance of the red polished ware, at about the same time as the flourishing of maritime trade with the Roman Empire, does suggest some connection, especially given the geographical location of Saurashtra. The *Periplus* lists an extensive range of goods that could be traded at Barygaza (Bharuch), but does not mention fine table wares (L. Casson 1989). Wheeler first identified genuine Arretine ware in India, from the site of Arikamedu (R.E.M. Wheeler 1946), since when numerous other finds have been reported, but principally from south India. Although Subbarao

(1953) and S.R. Rao (1966) have examined this problem in some depth, a great deal of uncertainty still remains as to the nature of the relationship between the two wares.

At Sannathi red polished ware represents only very minor percentage of the total pottery assemblage from the excavation. This may be because of the nature of the usage of the mound, religious rather than domestic, which makes this type of pottery is infrequent. It is certainly true that in the pottery scatters in the fields of Ranamandala (SAN-2), the ware is more common than is suggested by the assemblage from the excavation. A second possibility is that whilst the ware is common in western India, it is not so common in the Sannathi region. Although it has been reported from such sites as Kondapur, Nagarjunakonda, Yeleswaram, Kalingapattnam and Salihundam in Andhra Pradesh and from Piklihal, Chandravalli and Maski in Karnataka, excavations at Satanikota, a site comparable in many ways to Sannathi, also produced only limited amounts of red polished ware.

Only four types of form were found from the excavation of the stupa mound at Sannathi, the most common of which is the more durable sprinkler head. The fabric is very fine and the colour universal light red. The slipped surface is polished to a dark red colour. The four types (fig. 10) identified are:

Type 1 Rounded base of red polished ware with flat bottom.

Type 2 Vase of red polished ware with restricted neck and out-turned plain rim.

Type 3 Head of a sprinkler of red polished ware, with flaring flat topped rim.

Type 4 Body sherd of red polished ware, the outer profile of which is rippled. Not enough of the vessel remains intact to identify its form.

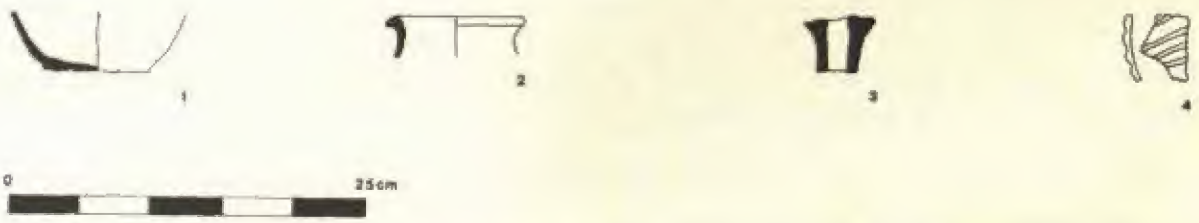


FIG. 10 : *Red polished ware*

C. BLACK AND RED WARE

The black and red wares are more common than the red polished ware. The interior of the vessels is uniformly black slipped and burnished to a high sheen. The black extends to the upper portion of the exterior, whilst the lower parts of the sides, and the bases of the vessels have irregular red colouring, resulting from various degree of oxidisation during firing.

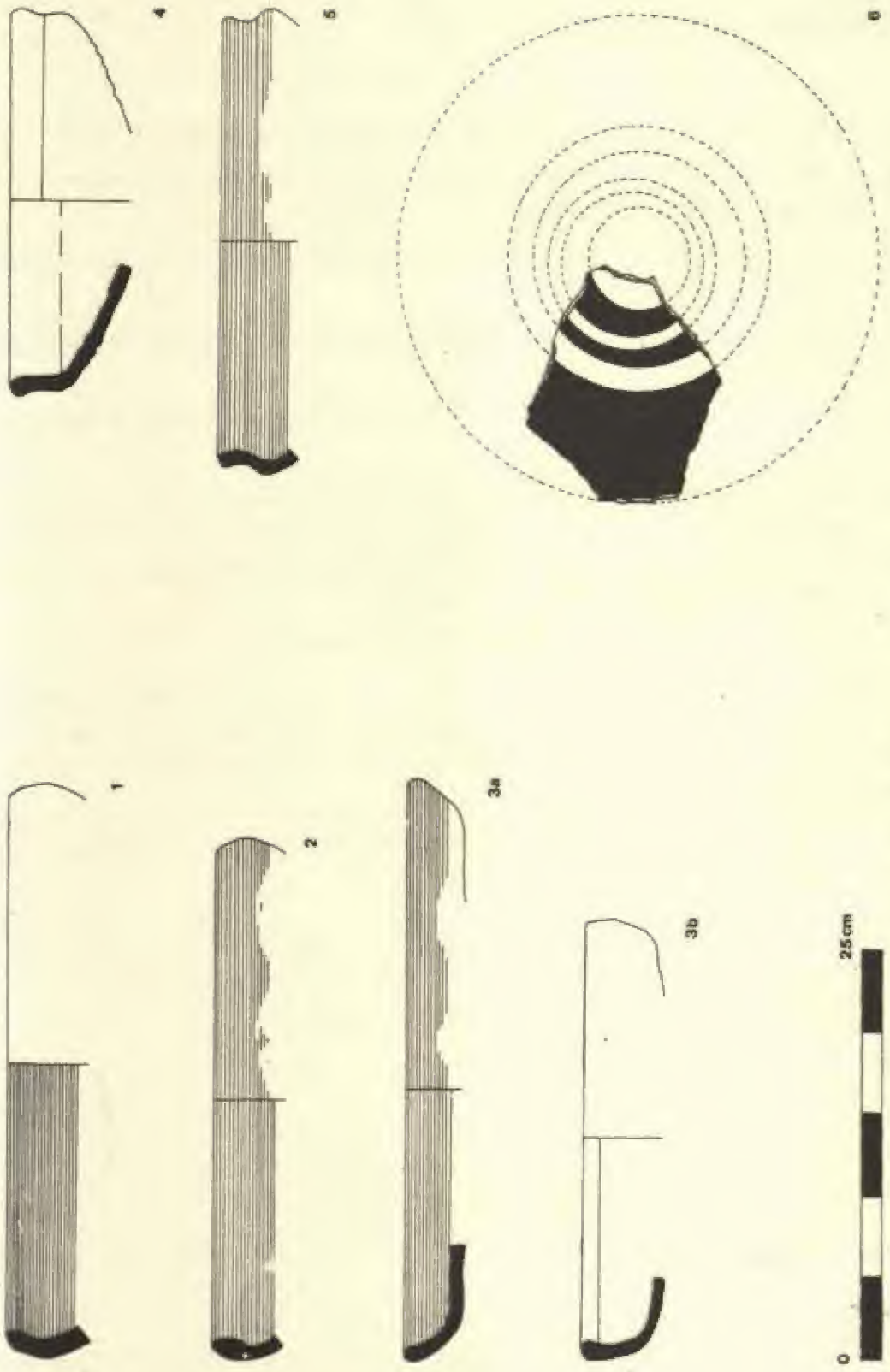


FIG. 11 : *Black and red ware*

The different types (fig. 11) are listed below:

Type 1 Dish of black and red ware with incurved plain rim and convex sides.

Type 2 Dish of black and red ware with incurved internally thickened rim and convex sides.

Type 3a Dish of black and red ware with outward curving internally thickened rim. The convex sides are rounded to a flat base.

Type 3b Dish of black and red ware with vertical, internally thickened rim. The convex sides are rounded to a flat base.

Type 4 Dish of black and red ware with plain outturned rim, weakly carinated body and rounded base.

Type 5 Dish of black and red ware with plain outturned rim, concave sides and weakly carinated body.

Type 6 Body sherd of black and red ware, probably the base of a plate. The black interior surface is decorated with three irregular concentric white painted circles. The minimum diameter of the plate is 239 mm. A second sherd with the same type of decoration was found, from a plate with a minimum diameter of 166 mm.

D. BLACK WARE

As with the red polished ware, the black ware makes up only a small proportion of the pottery from Sannathi. The vessels are treated with a slip on both the exterior and the interior and lightly burnished, not giving a highly polished finish. The forms are similar to those of the black and red wares, and are listed below (fig. 12):

Type 1 Dish of black ware with vertical, internally thickened rim and straight sides, rounded to a flat base.

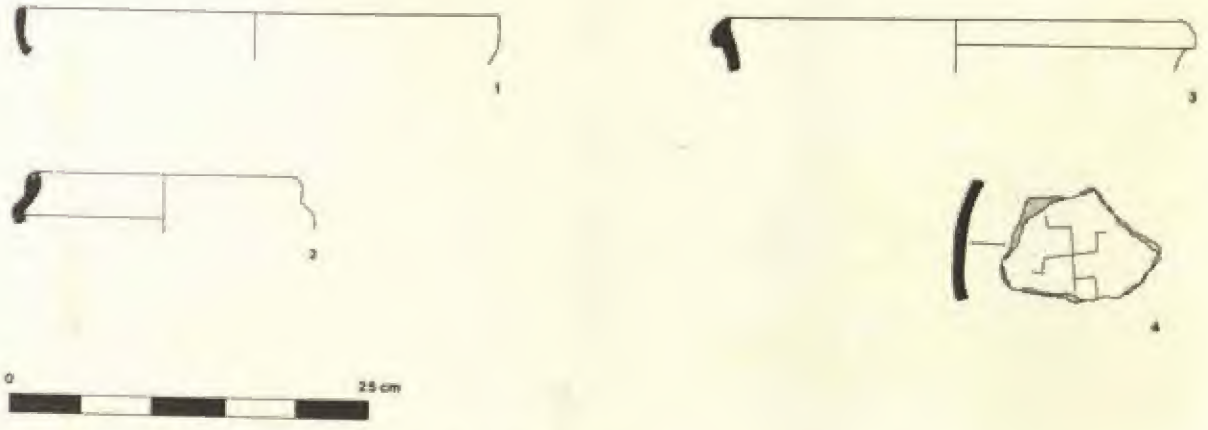


FIG. 12 : *Black ware*

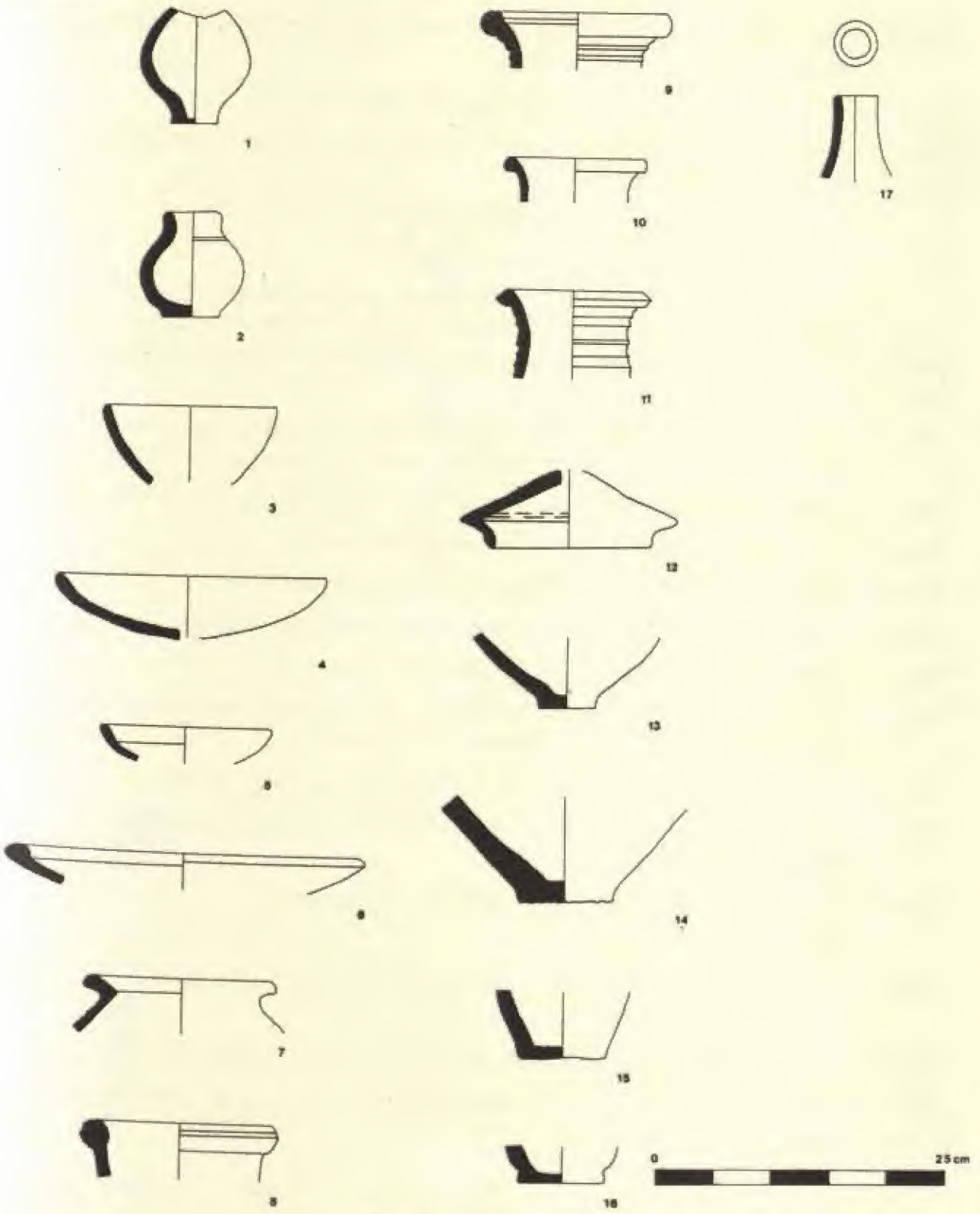


FIG. 13 : *coarse red ware*

Type 2 Dish of black ware with plain out turned rim and carinated body, possibly with rounded base.

Type 3 Vase of black ware with externally thickened, under cut rim.

Type 4 Body sherd of black ware. On the inner surface of the sherd there is an incised graffito in the form of a crude swastika.

E. RED WARES

(i) Coarse Red Ware

The most common pottery fabric from Sannathi is a coarse red ware. The fabric vary from example to example, but are generally coarse in texture, with multiple inclusions. These wares probably represent the more utilitarian forms, including cooking vessels and storage jars. The major forms are (fig. 13) :

Type 1 Small globular vessel of red ware, on a raised concave pedestal base. The rim portion is missing, but it may have had a spouted neck, similar to type 17, and be a small flagon.

Type 2 Small goblet of red ware, with a vertical rim, incised with two lines at the neck.

Type 3 Deep bowl of red ware with plain rim and convex profile.

Type 4 Shallow bowl of red ware with plain rim and convex profile.

Type 5 Shallow dish of red ware with internally thickened and grooved rim.

Type 6 Shallow bowl of red ware with internally thickened collar.

Type 7 Vase of red ware with sharply out-turned, externally thickened rim. The vessel has an oblique shoulder with external cordons.

Type 8 Vase of red ware with vertical round collared externally grooved rim.

Type 9 Vase of red ware with out-turned round collared, internally grooved rim. The neck is concave and cordonned.

Type 10 Vase of red ware with out-curved externally thickened rim.

The neck is restricted and concave.

Type 11 Vase of red ware with restricted neck and out-curved rim, externally thickened. The neck is elongated and corrugated.

Type 12 Lid of red ware with plain vertical rim and horizontally flanged waist.

Type 13 Base of red ware with vertical pedestal gradually curving to join vessel body.

Type 14 Base of red ware.

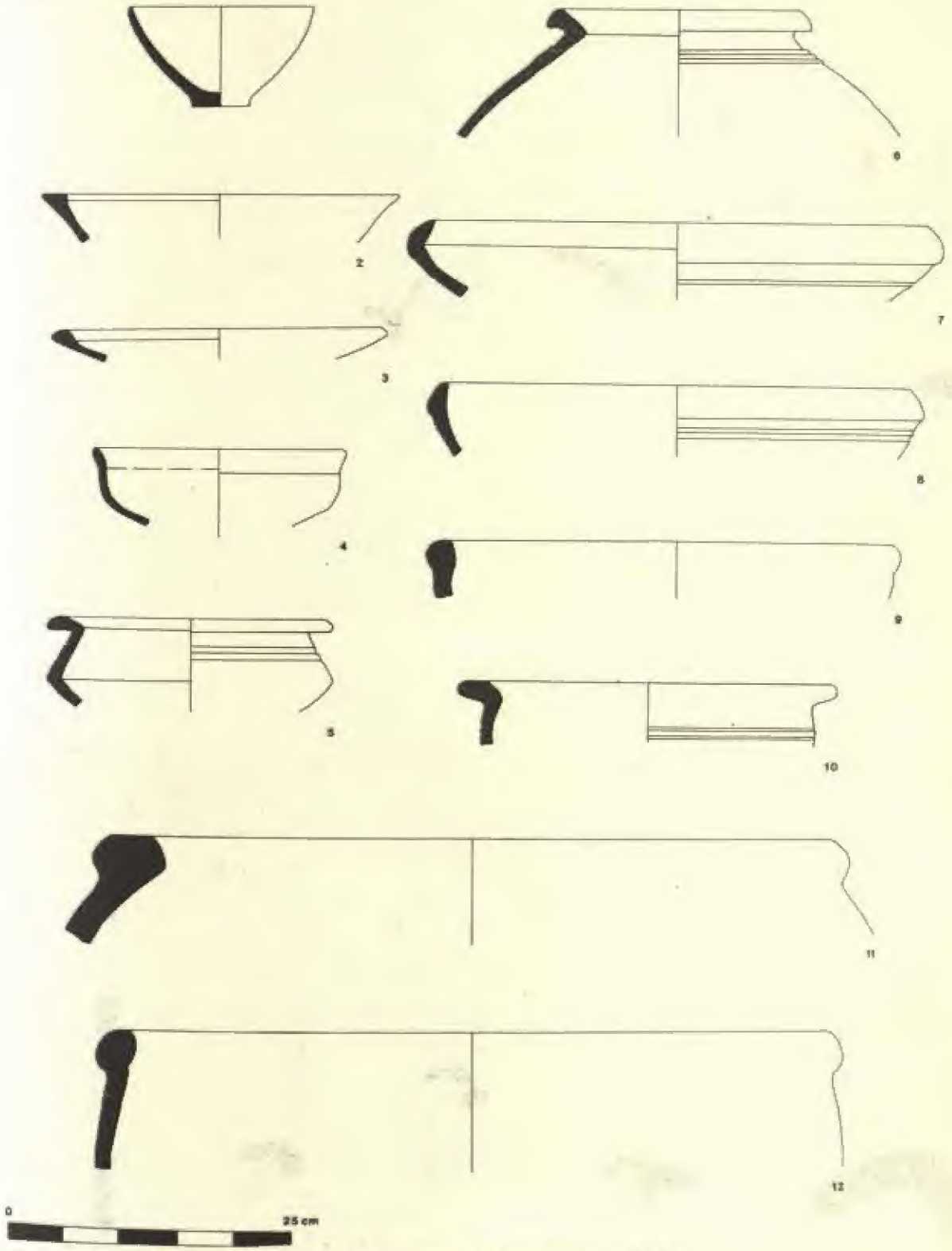


FIG. 14 : *slipped red ware, types 1-12*

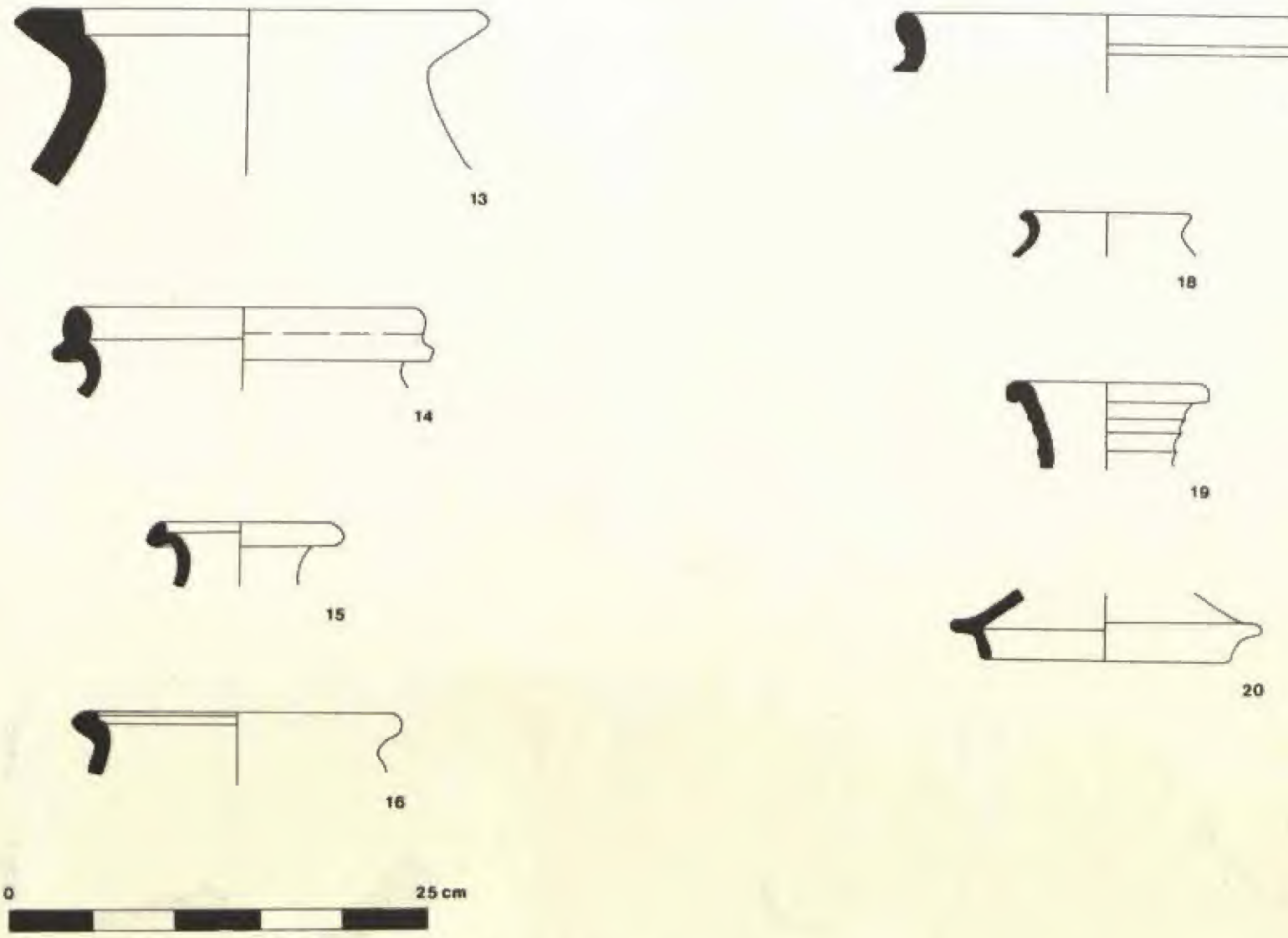


FIG. 15 : *slipped red ware, types 13-20*

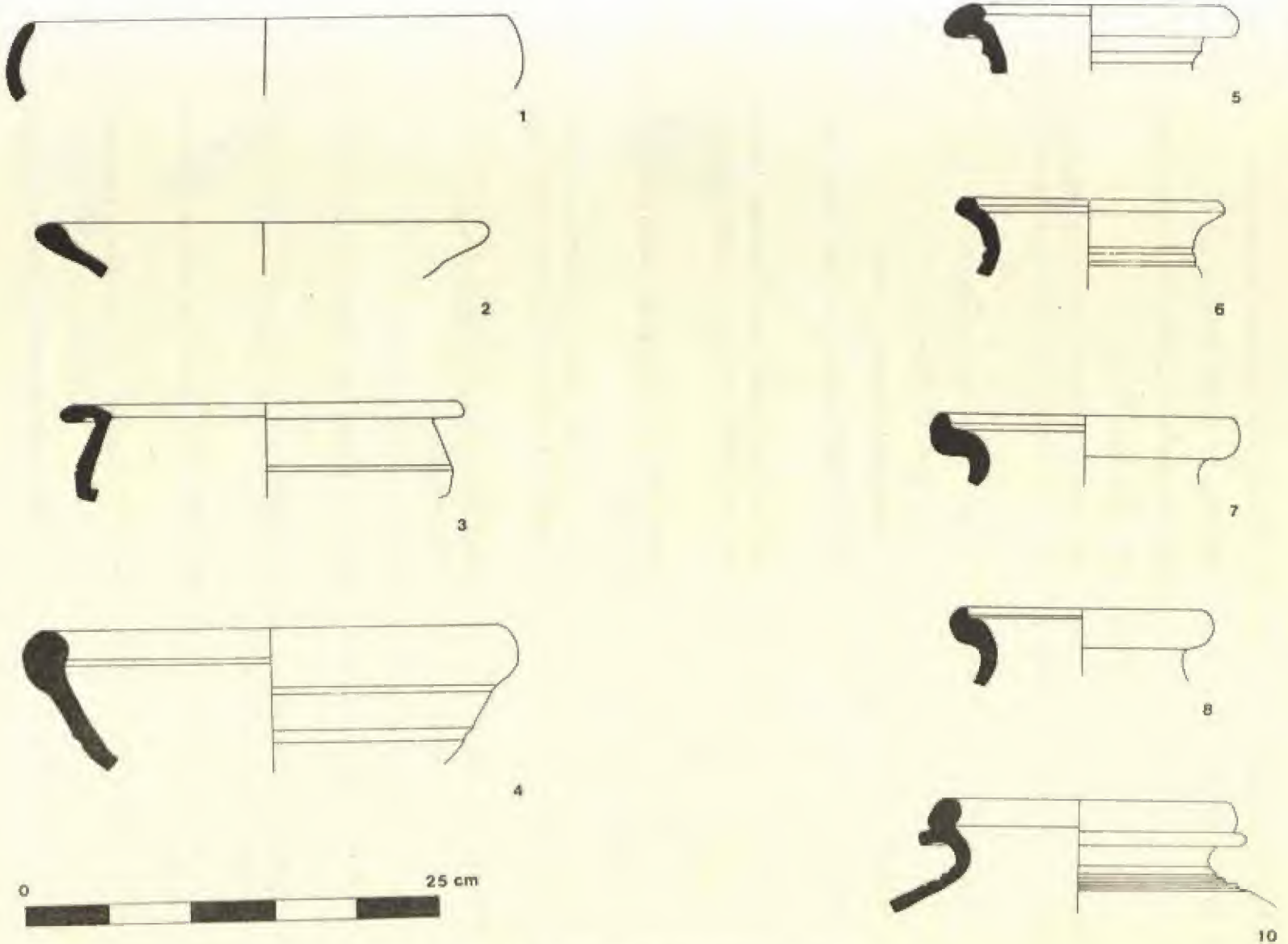


FIG. 16 : *Burnished red ware, types 1-9*

Type 15 Base of red ware with flat bottom, with sharp break to steep angled sides.

Type 16 Base of red ware with in-turned pedestal and rounded globular body.

Type 17 Spout of red ware, with plain vertical rim, gradually flaring towards the bottom.

(ii) Slipped Red Ware (fig. 14-15)

The slipped red wares occur in man of the same forms as the coarse red wares, and in a similar fabric. It may be assumed that the slip is applied to alter the porosity of the vessel. The recorded forms are :

Type 1 Deep bowl of slipped red ware with plain rim and convex profile.

Type 2 Shallow dish of slipped red ware with flanged flat topped rim

Type 3 Shallow dish of slipped red ware with internally thickened collar.

Type 4 Bowl of slipped red ware with plain out turned rim and carinated body, possibly with rounded base.

Type 5 Cooking vessel of slipped red ware with out-turned rim. The neck has an internal carination. The shoulder is convex and cordoned. There is an external carinated waist, and a rounded bottom.

Type 6 Vase of slipped red ware with sharply out-turned, externally thickened rim. The vessel has an oblique shoulder with external cordons.

Type 7 Bowl of slipped red ware with sharply in-turned, externally eliptical, collared rim. It appears to be shallow, possibly with rounded base. The outer surface is grooved just below the rim.

Type 8 Bowl of slipped red ware with in-turned oval collared rim. It is similar to type 7, but deeper and with a less in-turned rim. The body is grooved.

Type 9 Basin of slipped red ware with vertical, round collared rim.

Type 10 Basin of slipped red ware with sharply out-turned, externally thickened rim. Externally grooved about rounded shoulders.

Type 11 Large storage jar of slipped red ware. The externally thickened oval collared rim is in-turned and flattened on the top.

Type 12 Large storage jar of slipped red ware. The vessel has almost vertical sides and a round collared rim.

Type 13 Large storage vase of slipped red ware with internally thickened beaked rim and concave neck.

Type 14 Vase of slipped red ware with internally thickened vertical rim. It is internally grooved and

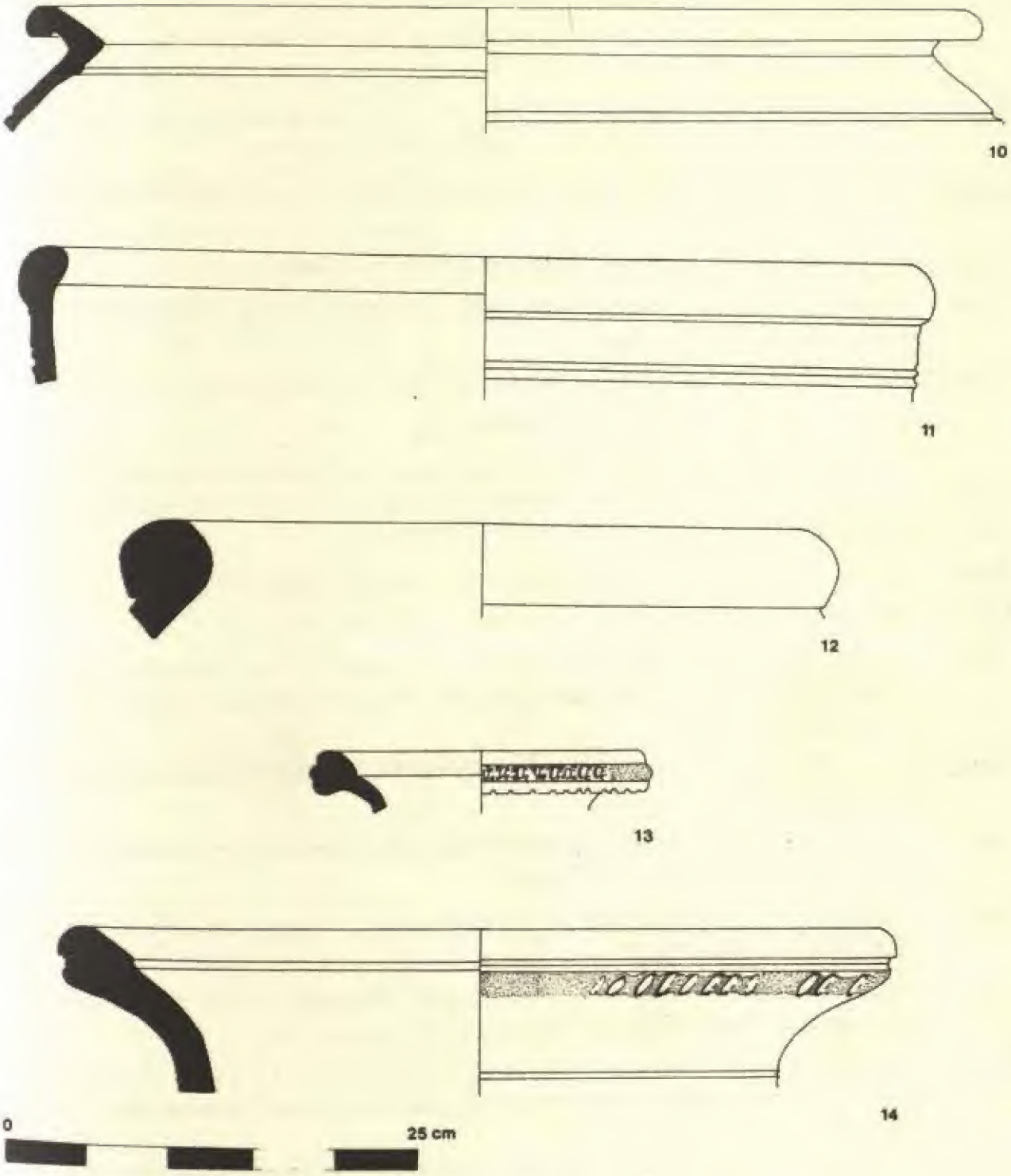


FIG. 17 : *Burnished red ware, types 10-14*

externally cordonned. The neck is short and concave.

Type 15 Vase of slipped red ware with oval collared and externally under cut rim. The neck is concave.

Type 16 Vase of slipped red ware with restricted neck. The double-curved rim is externally thickened and internally grooved. The neck is short and concave.

Type 17 Vase of slipped red ware with outward turned rounded rim. Incised lines around the concave neck.

Type 18 Vase of slipped red ware with restricted neck and out-turned plain rim.

Type 19 Vase of slipped red ware with restricted neck and out-curved rim, externally thickened. he neck is elongated and corrugated.

Type 20 Lid of slipped red ware with plain vertical rim and horizontally flanged waist.

(iii) Burnished Red Ware (fig. 16-17)

As in the case with the slipped red ware, these wares are similar to the other red wares in many of the forms. The burnishing again decreases the porosity of the vessel, which may account for this finish on some of the larger storage jars. The selected forms are:

Type 1 Dish of burnished red ware with incurved plain rim and convex sides.

Type 2 Shallow bowl of burnished red ware with internally thickened collar.

Type 3 Cooking vessel of burnished red ware with out-turned rim. The neck has an internal carination. The shoulder is convex and cordoned. There is an external carinated waist, and a rounded bottom.

Type 4 Basin of burnished red ware with round collared rim. The base is rounded with external incised grooves.

Type 5 Vase of burnished red ware with out-turned oval collared, internally grooved and under cut rim. The neck is concave and cordonned.

Type 6 Vase of burnished red ware with out-turned internally thickened and grooved rim. The neck is concave and grooved.

Type 7 Vase of burnished red ware with restricted neck. The double-curved rim is externally thickened and internally grooved. The neck is short and concave.

Type 8 Vase of burnished red ware with restricted neck, similar to type 7, but with longer concave neck and less pronounced external thickening. The rim is vertical, rounded and internally grooved.

Type 9 Vase of burnished red ware with internally thickened and grooved in-turned rim. It has an external under cut cordon. The neck is short and concave. The shoulder has three grooves.

Type 10 Vase of burnished red ware with sharply out-turned, externally thickened under cut rim. The shoulder is oblique, externally grooved and internally cordoned.

Type 11 Basin of burnished red ware with in-turned oval collared rim and externally grooved body.

Type 12 Storage jar of burnished red ware with in-turned external round collared rim.

Type 13 Vase of burnished red ware with out-turned, externally thickened and under-cut rim. The rim has an external cordon decorated with incised vertical strokes. The bottom edge of the under-cutting rim is notched.

Type 14 Storage jar of burnished red ware with out-turned internally thickened rim. The rim has an external groove, beneath which is a decorated band of incised oblique strokes. The neck is concave and grooved.

CHAPTER VI

COINS

A. COIN TYPOLOGY

A total of seventy-nine coins were obtained from SAN-1, SAN-2 and SAN-8 mounds at Sannathi. The excavated mound (SAN-1) yielded coins in stratified context, whilst the other two mounds yielded unstratified coins from the surface. The distribution of the coins is tabulated below:

	SAN-1		*SAN-2*			*SAN-8*		
	Lead	*Cu Alloy*	*Lead*	*Cu Alloy*	*Silver*	*Lead*	*Cu Alloy*	*Total*
Inscribed	30	6	12	-	-	2	-	50
Uninscribed	3	1	7	3	-	-	1	15
Unidentifiable	-	-	5	3	-	-	-	8
Punch marked	-	-	-	-	1	-	-	1
Medieval	-	-	-	5	-	-	-	5
Total	33	7	24	11	1	2	1	79

Out of the seventy-four early historical coins, fourteen are copper alloy, one is silver and remaining fifty-nine are lead. Of the stratified coins from SAN-1 thirty are lead and five are copper alloy. There are three lead and two copper alloy coins amongst the unstratified coins from SAN-1.

The lead coins are either circular, oval or irregular in shape ranging in weight from one to ten grams. The copper alloy coins are square, rectangular and circular in shape weighing from one to four grams. The coins are classed into different types and sub-types based on the main and auxilliary symbols on the obverse and reverse. The three arched hill symbol occurs on the obverse of the majority of the coins. The symbol can be crescented, have a plain or chisel base and can overlie a horizontal or wavy line. The legend around the periphery is usually in an anti-clockwise direction, but is occasionally clockwise. The reverse bears the Ujjain symbol which is also variable. It can be crescented, have single or double circles and have pellets at the centre of the orbs. Other symbols that

occur commonly on the obverse of coins are animal devices such as a bull, lion or elephant. The various types and sub-types of the coins are listed below (pls. XIX-XX) :

(i) Inscribed Lead Coins

Type 1

Obverse : Humped Bull, facing right, with *Srivatsa* in front of legs. Inscription, clockwise from XII : *RA NO...*

Reverse : Branched tree with four solid leaves.

Acc. No.	*Provenance*	*Context*	*Size (mm)*	*Weight (gms)*
485	SAN-I	230	17	4·351

This coin is attributable to Satakarni I on the basis of its devices, its size and its weight. It is similar to the coin, ascribed to Satakarni I, reported from Nevasa (S. B. Deo, *et al.* 1960, No. 1195. pl. 81. 4, size 16mm, weight 4·665 gm). P.L. Gupta did not attribute these coins to any king since the legend on the coin is not clear (A. M. Shastry (ed.) 1972, p. 136). Nissar Ahmed is of the opinion that the Nevasa coin belongs to Satakarni II (A. M. Shastry (ed.) 1972, *op. cit.* p.3). I.K. Sarma assigned this coin type to Satakarni I (I.K. Sarma 1980, p. 148).

Stratigraphically it comes from context 230 which is the earliest deposit sealing the platform to the south side of the mound, along its eastern side. It is therefore to be considered later than the main phase of the platform. Since later coins were found in deposits sealed by this layer, it may be a residual coin in this context, as discussed below. It may have originated in the Nevasa region and reached Sannathi with prolonged circulation. It may however help us to establish the extent of the rule of Satakarni I in the region.

Type 2

Obverse : Three-arched hill surmounted by triangular-headed standard. Inscription, clockwise : *RA NO SI RI SA TA VA HA NA*

Reverse : Ujjain symbol.

Acc. No.	*Provenance*	*Context*	*Size (mm)*	*Weight (gms)*
65	SAN-2	-	23×21	10·183
502	SAN-2	-	20	6·153

The legend without metronymics recalls the early rulers of the Satavahana dynasty. The symbols were used on the coins of king Satavahana from Nevasa. This type appears to be a new and unpublished variety of King Satavahana, perhaps issued in North Karnataka. Since these are from the surface collection from SAN-2, it is possible that more of this type may come to light if excavations are conducted on the mound. It is the heaviest type of coin recovered from Sannathi.

Type 3

Obverse : Three arched hill surmounted by triangular headed standard, flanked left and right by *Triratna* and *Swastika*. Inscription, clockwise : *MA HA RA- SI RI SA TA VA HA NA*

Reverse : Ujjain symbol.

Acc. No.	*Provenance*	*Context*	*Size (mm)*	*Weight (gms)*
28	SAN-2	-	16×12	3·623
109	SAN-2	-	17	3·173
190	SAN-2	-	17	3·247
434	SAN-2	-	16×13	2·670
588	SAN-2	-	17×14	3·080
590	SAN-2	-	18	4·361
591	SAN-2	-	14	3·261

This is a multi-symbol type coin. The main device is the same as type 2 wih the addition of two auxiliary symbols flanking it. It may be a smaller issue of king Satavahana. The honorific prefix is different from type 2, where it is Rano, who issued the coins before becoming Maharaja. The legend on the coin clearly refers to the king Satavahana who perhaps ruled independantly in the area under consideration, or perhaps called himself Maharaja, a title for his achievements during his reign in the area.

The three-arched hill and triangular-headed standard symbols were used as auxiliar symbols on the coins of Satakarni I and Satavahana in Nevasa and elsewhere, whereas these symbols were used as the main symbol at Sannathi. The coins bearing the legend Satavahana are attributed to Kumara Satavahana, the son of Satakarni I, by various scholars. The present types 2 and 3 appear to be new and unpublished issues of king Satavahana. These coins were not encountered from SAN-1.

Type 4

This is the largest coin type from Sannathi (26 specimens). It is further classified into eleven sub-types on the basis of auxiliary symbols. They are circular in shape, within the size range of 16-21 mm and between 1 and 5 grams in weight. The palaeography of the legend is thick and bold.

Type 4 i

Obverse : Crescented, three-arched hill over horizontal line. Inscription, anti clockwise from IV: *RA NO SI RI SA TA KA NI SA*

Reverse : Ujjain symbol, single circle with pellets.

Acc. No.	*Provenance*	*Context*	*Size (mm)*	*Weight (gms)*
3	SAN-1	1	20	3·156
29	SAN-1	4	20	3·846
385	SAN-1	73	19×17	2·329
431	SAN-1	150	19×17	3·040
495	SAN-1	230	20	2·840
496	SAN-1	156	19	2·058
516	SAN-1	293	21	2·265

496 and 516 are of the same type, but struck from a different die.

Type 4 ii

Obverse : Crescented, three-arched hill over horizontal line. Inscription, anti clockwise from IV: *RA NO SI RI SA TA KA NI SA*

Reverse : Ujjain symbol, single circle with pellets.

Acc. No.	*Provenance*	*Context*	*Size (mm)*	*Weight (gms)*
468	SAN-1	211	16	1·547

Similar to Type 4 i, but smaller in diameter.

Type 4 iii

Obverse : Crescented, three-arched hill over horizontal line. Inscription, anti-clockwise from IV: *RA NO SI RI SA TA KA NI SA*

Reverse : Ujjain symbol, double circle with pellets.

Acc. No.	*Provenance*	*Context*	*Size (mm)*	*Weight (gms)*
12	SAN-1	1	19	3·257
456	SAN-1	211	18	2·306
480	SAN-1	229	20	3·305

Type 4

Obverse : Crescented, three-arched hill with chisel base over horizontal line. Inscription, anti-clock wise from IV: *RA NO SI RI SA TA KA NI SA*

Reverse : Ujjain symbol, circle with pellets.

Acc. No.	*Provenance*	*Context*	*Size (mm)*	*Weight (gms)*
432	SAN-1	150	19	2·154
472	SAN-1	229	19	1·606
512	SAN-1	293	20	2·268
520	SAN-1	293	21	2·102

Type 4 v

Obverse : Crescented, three-arched hill with chisel base over wavy line. Inscription, anti clockwise from IV: *RA NO SI RI SA TA KA NI SA*

Reverse : Ujjain symbol, single circle with pellets.

Acc. No.	*Provenance*	*Context*	*Size (mm)*	*Weight (gms)*
85	SAN-1	1	18	4·802

Type 4 vi

Obverse : Crescented, three-arched hill with chisel base over wavy line. Inscription, anti-clockwise from IV: *RA NO SI RI SA TA KA NI SA*

Reverse : Ujjain symbol, double circle with pellets.

Acc. No.	*Provenance*	*Context*	*Size (mm)*	*Weight (gms)*
17	SAN-1	1	21×19	3·427
517	SAN-1	293	20	2·081
192	SAN-2	-	15	1·940

Type 4 vii

Obverse : Three-arched hill, no further detail. Inscription, anti-clockwise from IV: *RA NO SI RI SA TA KA NI SA*

Reverse : Ujjain symbol.

Acc. No.	*Provenance*	*Context*	*Size (mm)*	*Weight (gms)*
18	SAN-1	1	20	3·065

Type 4 viii

Obverse : Crescented, three-arched hill with chisel base over horizontal line. Inscription, anti clockwise from IV: *RA NO SI RI SA TA KA NI SA*

Reverse : Ujjain symbol, double circle with pellets.

Acc. No.	*Provenance*	*Context*	*Size (mm)*	*Weight (gms)*
1	SAN-1	1	16	2·259
2	SAN-1	1	16	1·391

Type 4 ix

Obverse : Crescented, three arched hill with chisel base. Inscription, anti-clockwise: *...(SI)... SA TA...*

Reverse : Ujjain symbol, double circle with pellets.

Acc. No.	*Provenance*	*Context*	*Size (mm)*	*Weight (gms)*
601	SAN-8	-	22	6·261

Type 4 x

Obverse : Crescented, three-arched hill over wavy line. Inscription, anti clockwise from IV: *RA NO*

Reverse : Ujjain symbol, double circle with pellets.

Acc. No.	*Provenance*	*Context*	*Size (mm)*	*Weight (gms)*
498	SAN-1	73	19	2·931
603	SAN-8	-	17×14	4·046

Type 4 xi

Obverse : Traces of inscription.

Reverse : Part of Ujjain symbol.

Acc. No.	*Provenance*	*Context*	*Size (mm)*	*Weight (gms)*
457	SAN-1	156	23510	2·071

Coins of type 4 were reported from Kondapur (Rama Rao 1961, pl. 7, no. 92) and from a private collection in Hyderabad (NDI, pl. 1, pII No. 9, 10; JNSI XXVIII, pp. 55-57, pl. III no. 4) and Nevasa (4106 pl. 83.6). These coins were ascribed to Satakarni II (I. K. Sarma 1980). The coins already published, ranging in size between 18 and 20mm and in weight between 2·008 and 2·073 gm, are similar to this type from Sannathi. I. K. Sarma remarks that "Satakarni II brought out this new issue in baser metal taking the three arched hill symbol out of the obverse bull type of Satakarni I..... that this coin type was continued in the same fashion by one of his distant successors Pulumavi I" (I. K. Sarma 1980, pp. 79-80). The coins already published, ranging in size between 18 and 20 mm and in weight between 2·008 and 2·073 gm, are similar to this type from Sannathi. All these coins

are generally confined to the Asmaka region.

The 21 stratified coins come from contexts 1,4,73,150,156,229,230 and 293. Context 293 represents the earliest occupation of the platform and the coins found from it provide the dating material for the main phase of usage of the platform. It has yielded 4 coins of this type ascribable to Satkrni II. Similarly contexts 229 and 230 represent the earliest deposits sealing context 293 and also yielded coins of this type. Context 73, which seals 229 nd 230, has also yielded two coins of this type. Thus these coins of Satakarni II are found throughout the deposit on the platform, which helps to date the platform to his reign. In this case the coin of Satakarni I (Type 1, Context.230, Acc. No. 485) is a residual find in this context.

Type 5

Obverse : Crescented, three-arched hill over horizontal line. Inscription, clockwise : - *SA TA* -

Reverse : Ujjain symbol, single circle with pellets.

Acc. No.	*Provenance*	*Context*	*Size (mm)*	*Weight (gms)*
530	SAN-1	U/S	18mm	1·670

Similar to type 4 i, except that the inscription is in a clockwise direction and the letters are bold. It also belongs to Satakarni II.

Type 6

Obverse : Crescented, three-arched hill with chisel base over horizontal line. Inscription, anti clockwise from IV : *RAM NO SI RI SA TA KA NI SA*

Reverse : Ujjain symbol, double circle with pellets.

Acc. No.	*Provenance*	*Context*	*Size (mm)*	*Weight (gms)*
26	SAN-2	-	18	2·628
528	SAN-2	-	19	3·426

It is similar to sub-type 4 iv excepting that the honorific Rano is written Ram no. However, there is some difference in the chracters of the script, where in this type, the letters are a somewhat linear but bold type. These are assigned to King Satakarni II.

Type 7

Obverse : Crescented, disjointed three-arched hill with chisel base over horizontal line. Inscription, anti-clockwise from III : *PU LU MA VI SA*

Reverse : Ujjain symbol

Acc. No.	*Provenance*	*Context*	*Size (mm)*	*Weight (gms)*
423	SAN-1	1	20	3·598
444	SAN-1	157	19	4·912

These two coins can be ascribed to Pulumavi I. The characters of the inscription are early, stumpy and short forms clearly resembling the inscription on the Satakarni II coins (Type 4) and are a continuation of the earlier type.

The reverse of the coin bears the Ujjain symbol, with some unclear marks at the periphery. Mirashi (1962 p. 125) identified these as letters and read "Hala" and therefore attributed the coin to the king Hala of the Satavahana line. Later it was identified as a *naga* symbol by P. L. Gupta and as a *srivatsa* symbol, in between the orbs of the Ujjain symbol, by I. K. Sarma. Unfortunately the symbols on this coin from Sannathi are also not clear, and only a well preserved coin will resolve this controversy.

Earlier such coins were reported from Kondapur, Hyderabad (*JNSI*, XXII or XXIII, pp. 147-149, pl. VIII 10; *JNSI*, XIII, pl. VI. 3). Nisar Ahmed (A. M. Shastry (ed) 1972, p. 136) and I. K. Sarma (*op. cit.* pp. 93, and 199) ascribe these coins to Pulumavi I. Another coin of this type was found recently from excavations at Veerapuram (T. V. G. Sastri, M. Kasturi Bai and J. Vara Prasada Rao 1984 p. 85) and assigned to king Pulumavi I. Raja Reddy *et al* reported a similar coin from Kondapur (Uninscribed Coins of Andhra 1984 no. 4. p. 75).

One of the coins was found from the surface deposit while the other comes from context 157. The latter deposit represents a robbing activity of the platform and seals context 230. As discussed earlier, context 230 and the other deposits from the platform (293 and 229) yielded several coins of Satakarni II. The coin of Pulumavi I from the context sealing the platform therefore stratigraphically reflects the chronological relationship between Satakarni II and his descendant Pulumavi I.

Type 8

Obverse : Three-arched hill symbol over horizontal line.
Traces of inscription clockwise *RA NO.....(NI).SA.*

Reverse : Ujjain symbol, single orb with pellet.

Acc. No.	*Provenance*	*Context*	*Size (mm)*	*Weight (gms)*
187	SAN-2	-	17	3·231

The arches and letters, on this coin, are linear and different in palaeography from the coins of Satakarni I, II and Pulumavi I. The are more similr to the later types, such as type 9. The legend starts at XII o' clock, a practise introduced by Gautamiputra Satakarni and continued by his successors. In addition to this the legend ends with (Ni) Sa which implies that this must be a coin of one of the Satakarnis. It must therefore be an issue of either Gautamiputra Satakarni or of Vasishthiputra Satakarni. Inscribed memorial stones to both of these kings have been found a Sannathi (G.S. Gai (ed) *A.R.I.E.* for 1968-69; I.K. Sarma and J.V.P. Rao 1989. Paper presented to E.S.I., to be published).

Type 9

Obverse : Crescented, three-arched hill symbol with chisel base over horizontal line. Inscription clockwise from XII off the flan.

Reverse : Ujjain symbol, double circle with pellets.

Acc. No.	*Provenance*	*Context*	*Size (mm)*	*Weight (gms)*
464	SAN-1	U/S	17	2·314

Unlike the letters on the coins of Satakarni II and Pulumavi I here the characters are linear and elongated, suggesting that they are later. The legend starts with the honorific Rano above the crescent a XII o'clock. P. L. Gupta reviewed the three arched hill type coins and assigned them to Rano Vasishthiputra Pulumavi, Vasishthiputra Siva Siri Pulumavi and Vasishthiputra Chada Satisa (A. M. Shastry (ed) 1972, pp. 52-53). This coin is tentatively attributed to Vasishthiputra Pulumavi or Vasishthiputra Siva Siri Pulumavi. It should be noted that an inscription of Vasishthiputra Siva Siri Pulumavi was found at Sannathi (I. K. Sarma and Rao, J.V.P. 1989, Paper presented to E.S.I, to be published).

(ii) Uninscribed Lead Coins

Type 10 i

Obverse : Uninscribed, three arched hill over horizontal line.

Reverse : Ujjain symbol.

Acc. No.	*Provenance*	*Context*	*Size (mm)*	*Weight (gms)*
22	SAN-1	2	13×11	
81	SAN-2	-	15	3·640
533	SAN-2	-	14	1·272
586	SAN-2	-	14	2·345

Type 10 ii

Obverse : Uninscribed, three arched hill with chisel base over horizontal line.

Reverse : Ujjain symbol.

Acc. No.	*Provenance*	*Context*	*Size (mm)*	*Weight (gms)*
21	SAN-1	2	13	1·822
70	SAN-1	1	14	1·421
430	SAN-1	127	12	1·865

Type 11

Obverse : *Triratna* symbol.

Reverse : Ujjain symbol with pellets.

Acc. No.	*Provenance*	*Context*	*Size (mm)*	*Weight (gms)*
193	SAN-2	-	13	2·723

Type 12

Obverse : Triangular headed standard in an incuse.

Reverse : No detail visible.

Acc. No.	*Provenance*	*Context*	*Size (mm)*	*Weight (gms)*
194	SAN-2	-	11	1·099

The device is akin to type 10 of inscribed variety.

Type 13 i

Obverse : Traces of linear animal (Lion?)

Reverse : Ujjain symbol.

Acc. No.	*Provenance*	*Context*	*Size (mm)*	*Weight (gms)*
196	SAN-2	-	6	1·163

Type 13 ii

Obverse : Traces of linear animal (Lion?)

Reverse : Ujjain symbol.

Acc. No.	*Provenance*	*Context*	*Size (mm)*	*Weight (gms)*
587	SAN-2	-	16	3·331

13 i sub-type is small and the animal is facing right while 13 ii is big and the animal facing left. The animals are depicted in a very linear fashion and as if running.

(iii) Inscribed Copper Alloy Coins

Type 14

Obverse : Three arched hill. Inscription, anti-clockwise : *RANO SI RI SA TA KA NI SA.*

Reverse : Ujjain symbol.

Acc. No.	*Provenance*	*Context*	*Size (mm)*	*Weight (gms)*
88	SAN-1	1	16×15	1·822
414	SAN-1	127	16	1·649

416	SAN-1	127	16×18	1·199
460	SAN-1	U/S	15×13	0·426
497	SAN-1	U/S	13	2·634
518	SAN-1	293	13	2·599

There are six rectangular or square coins similar to the coins of Satakarni II. The legend has bold letters and reads Rano Siri Satakanisa. These coins can be assumed to be the copper alloy issues of Satakarni II. Three of the coins (Acc. Nos. 88, 414 and 518) were overstruck with a triangular headed standard, on the reverse, over the Ujjain symbol, perhaps for recirculation.

Coin 518 comes from context 293, the earliest occupation deposit on the plaform, which other coins of Satakarni II. Coins 414 and 416 come from context 127 which is a later deposit on the mound. No published parallels for these coins can be found.

Type 15

Obverse : Bull facing right over triangular headed standard.
Inscription clockwise unclear.

Reverse : Ujjain symbol.

Acc. No.	*Provenance*	*Context*	*Size (mm)*	*Weight (gms)*
476	SAN-1	229	17	2·840

This coin comes from context 229 where lead coins of Satakarni II where found. The bull and triangular headed standard symbols were used on the lead and copper coins, of Satakarni I and II, which were used on the lead and copper coins, of Satakarni I and II, which were reported from Nevasa. Since the legend on this coin is off the flan, it is difficult to assign. However the symbols on it may give some basis to attribute this coin type to the early rulers of the Satavahana dynasty, such as Satakarni I or Satakarni II.

(iv) Uninscribed Copper Alloy Coins

Type 16

Obverse : Elephant facing left.

Reverse : Crescented three-arched hill.

Acc. No.	*Provenance*	*Context*	*Size (mm)*	*Weight (gms)*
191	SAN-2		13	1·519
604	SAN-8		15	2·804

This type of cast coin is found in central India dauable to the second to third century BC (Allan 1936. pl XI. No. 25; pl, XXXIV. 18. James Prinsep, *Essays on Indian Antiquities*, 1858, ASR XX II, 103).

Type 17

Obverse : Traces of animal.

Reverse : Ujjain symbol with pellets.

Acc. No.	*Provenance*	*Context*	*Size (mm)*	*Weight (gms)*
188	SAN-2	-	1210	1·511

Type 18

Obverse : Symbols unclear.

Reverse : Part of Ujjain symbol.

Acc. No.	*Provenance*	*Context*	*Size (mm)*	*Weight (gms)*
504	SAN-2	-	16515	0·782

(v) Silver Punch Marked Coin

Type 19

Obverse : Sun, animal and two unclear symbols.

Reverse : Fish in tank?

Acc. No.	*Provenance*	*Context*	*Size (mm)*	*Weight (gms)*
592	SAN-2	-	15513	2·973

(vi) Unidentifiable Coins

1. Lead

Acc. No.	*Provenance*	*Context*	*Size (mm)*	*Weight (gms)*
4	SAN-1	1	21	4·459
27	SAN-2	-	13	1·728
68	SAN-2	-	30	1·728
189	SAN-2	-	15	1·465
195	SAN-2	-	13×11	1·426

2. Copper Alloy

Acc. No.	*Provenance*	*Context*	*Size (mm)*	*Weight (gms)*
11	SAN-2	-	10×10	1·021
110	SAN-2	-	11×9	0·889
185	SAN-2	-	12×10	0·554
197	SAN-2	-	1456	1·115

3. Medieval

Acc. No.	*Provenance*	*Context*	*Size (mm)*	*Weight (gms)*
186	SAN-2	-	16	6·194
378	SAN-2	-	20	9·211
380	SAN-2	-	19	9·641
503	SAN-2	-	14	3·451
589	SAN-2	-	17	5·388

(vii) Conclusion

The excavated mound (SAN-1) has produced coins of the kings Satakarni I, Satakarni II, Pulumavi I and either Vasishthiputra Pulumavi or Vasishthiputra Siva Siri Pulumavi. The bull coin of Satakarni I has been shown to be in a residual context. A copper bull coin (Acc. No. 476) may also be assigned to Satakarni I on typological grounds, but coming from a context that also yielded coins of Satakarni II (229), it is also residual if ascribed to the earlier king. The occurrence of these coins at Sannathi may help to establish the extent of the rule of Satakarni I. A variety of lead and copper coins of Satakarni II have been found throughout the stratigraphy post dating the platform on the south side of the mound. This suggests that the most likely date for the construction of the platform would be during the reign of Satakarni II. The coin of Pulumavi I is found from a later context (157) to those of Satakarni II, and therefore reflects the established chronological sequence.

A coin from the surface (Acc. No. 464) is tentatively ascribed to Vasishthiputra Pulumavi or Vasishthiputra Siva Siri Pulumavi on the basis of the characters of the legends and other published examples. Along with the discovery of an inscription to him it may suggest that Sannathi falls into the area ruled by Vasishthiputra Siva Siri Pulumavi.

The coins from SAN-2 add evidence for two further kings of the Satavahana line, king Satavahana and either Gautamiputra Satakarni or Vasishthiputra Satkarni. The coin types 9 and 10 of king Satavahana appear to be new and so far unpublished varieties. The occurrence of two well

preserved coins of this king suggest that Sannathi might have flourished from the early Satavahana period. Future excavations in the Ranmandala area (SAN-2) may throw more light on the early history of the Satavahanas.

The coins of Satakarni I and Satavahana come from places such as Kondapur, Kotalingala, Nevasa and Bhokardan. Geographically these sites fall into the ancient regions of Mulaka, Asika and Asmaka. Sannathi is in the Asmaka region. A coin of Kumara Siri Sata, who was also one of the four sons of Satakarni I, was found at Satanikota which also comes under the Asmaka region. This indicates that the sons of Satakarni I were ruling different parts of the dominion invested with power to issue the coins in their names. As I.K. Sarma states "Siri Satavahana was wielding power from the capital under the very nose of his brother king Vedisri to start with at Pratishtana and was later in charge of Mulaka, Asika and Asmaka terrotories. He issued coinage in close correspondence with the early issues of his father Satakarni" (*op. cit.* 1980, p. 129). It therefore seems likely that king Satavahana was the ruler of the Sannathi area immediately after the reign of Satakarni I.

Satakarni II was the most powerful Satavahana king, ruling for fifty-six years and issuing a variety of coins. The power and prestige of the Satavahanas reached its highest extent during his reign. The distribution of his coins suggests that he annexed the Gujarat and Saurashtra region, to his original inheritance of the Avanti, Akara and Anupa territories.

After Satakarni II, Pulumavi I appears to have revived Satavahana power and ruled for twenty-four years (Vaya Purana). So far his coins are known from Asmaka and Mulaka regions. During the reign of Satakarni II, Sannathi appears to have played a pivotal role as one of the fortified cities of the Satavahanas and was further strengthened during the times of Gautamiputra Satakarni, Vasishthiputra Satakarni and Vasishthiputra Siva Siri Pulumavi.

The epigraphs and numismatic evidence from within the Asika region show that Satavahana dominion was extended into Karnataka. Gonahalli, Vadegaon-Madhavpur, Aihole, Banavasi, Chandravalli, Chitradurga and Sannathi yielded the Satavahana coins. These coins were assigned by various scholars to the kings Gautamiputra Satakarni, Vasishthiputra Pulumavi, Vasishthiputra Satakarni and Gautamiputra Yajna Sri Satakarni. The coins and inscriptions from Sannathi throw fresh light on the rule and history of the Satavahanas extending their influence in the area from the times of Satakarni I to that of Vasishthiputra Siva Siri Pulumavi.

B. CATALOGUE OF COINS FROM SANNATHI

Acc No.	*Material √Shape*	*Size mm*	*Weight gms*	*Detail*	*Provenance*
1	*2*	*3*	*4*	*5*	*6*
Type 1					
485	Lead Circular	17	4·351	Obv: Humped bull, facing right, with *Srivatsa* in front of legs. Inscription,	SAN-1

1	2	3	4	5	6
				clockwise from XII: *RA NO...* Rev: Branched tree with four solid leaves	
Type 2					
65	Lead Oval	23× 21	10·183	Obv: Three arched hill, surmounted by triangular headed standard. Inscription, clockwise from VIII : *RA NO SI RI SA TA VA (HA NA)* Rev: Crescented Ujjain symbol with small pellets.	SAN-2
502	Lead Circular	20	6·153	Obv: Three arched hill, surmounted by triangular headed standard, over zigzag line. Inscription, clockwise from IX : *RA NO SI RI SA TA VA HA NA-* Rev: Ujjain symbol.	
Type 3					
28	Lead Oval	16 × 12	3·623	Obv: Traces of triangular headed standard and inscription. Rev : No detail visible.	SAN-2
109	Lead Circular	17	3·173	Obv: Three arched hill, surmounted by triangular headed standard, in turn flanked by *triratna* an *svastika*, left and right respectively. Inscription, clockwise, from VIII : *MA HA RA...* Rev: Part of crescented Ujjain symbol.	SAN-2
190	Lead Circular	16	3·427	Obv: Triangular headed standard, *svastika* to right. Rev: No detail visible.	SAN-2
434	Lead Oval	16 × 13	2·670	Obv: Triangular headed standard. Inscription, clockwise: *SI RI SA* Rev: No detail visible.	SAN-2

1	2	3	4	5	6
588	Lead Oval	17 × 14	3·080	Obv: Three arched hill surmounted by triangular headed standard, with *svastika* and *triratna*, to right and left respectively. Inscription, clockwise —*TA VA-NA*— Rev: No detail visible.	SAN-2
590	Lead Circular	18	4·361	Obv: Triangular headed standard with *svastika*. Inscription, clockwise: *-(HA NA)...* Rev: No detail visible.	SAN-2
591	Lead Cirular	14	3·216	Obv: Triangular headed standard. Inscription, clockwise: *-TA VA-* Rev: Part of Ujjain symbol. with pellets.	SAN-2
Type 4 i					
3	Lead Circular	20	3·156	Obv: Crescented, three arched hill over horizontal line. Inscription, anti-clockwise from IV: *(RA) NO SI (RI) SA...* Rev: Ujjain Symbol with thick pellets.	SAN-1
29	Lead Circular	20	3·846	Obv: Crescented, three arched hill. Inscription, anticlockwise from IV: *(RA) NO SI-(SA)...* Rev: Ujjain symbol with thick pellets.	SAN-1
385	Lead Oval	19×17	2·329	Obv: Crescented, three arched hill over horizontal line. Inscription:.....*SA...* Rev: Part of crescented Ujjain symbol, with thick pellets.	SAN-1
431	Lead Oval	19×17	3·040	Obv: Crescented, three arched hill over horizontal line. Traces of inscription : *___NI___* Rev: Two orbs with pellets.	SAN-1
495	Lead Circular	20	2·840	Obv: Crescented, three arched hill over horizontal line. Inscription, anti-	SAN-1

1	2	3	4	5	6
				clockwise: *(RA) NO SI . . . .* Rev: Crescented Ujjain symbol.	
496	Lead Circular	19	2·058	Obv: Three arched hill over horizontal line. Inscription, anti-clockwise from IV : *RA* (No) _ _ _ _ *(KA) NI . . . .* Rev: Ujjain symbol with thick pellets.	SAN-1
516	Lead Circular	21	2·265	Obv: Part of three arched hill over horizontal line, in an incuse. Inscription anti-clockwise: _ _ _ _ _*NI SA* Rev: No detail visible	SAN-1
Type 4 ii					
468	Lead Circular	16	1·547	Obv: Three arched hill over horizontal line. Inscription, anti-clockwise: *(RA NO SI)*_ _ _*(NI)*_ _ _ Rev: Crescented Ujjain symbol, with thick pellets.	SAN-1
Type 4 iii					
12	Lead Circular	19	3·257	Obv: Three arched hill over horizontal line. Inscription, anti-clockwise from IV, partly off flan: *RA - - - - - - NI SA* Rev: Ujjain Symbol, double circle with pellets.	SAN-1
456	Lead Circular	18	2·306	Obv: Crescented, three arched hill over horizontal line. Inscription, anti-clockwise: (RI) SA... Rev: Ujjain symbol, double circle with pellets.	SAN-1
480	Lead Circular	20	3·305	Obv: Crescented, three arched hill over horizontal line. Inscription, anti-clockwise: ...*NI*...	SAN-1

1	2	3	4	5	6
				Rev: Two double circled orbs, with pellets.	
Type 4 iv					
432	Lead Circular	19	2·154	Obv: Crescented, three arched hill with chisel base over horizontal line. Inscription, anti-clockwise from IV: *(NO SI RA) SA TA (KA NI SA)* Rev: Ujjain symbol, double circle with pellets.	SAN-1
472	Lead Circular	19	1·606	Obv: Three arched hill with chisel base over horizontal line. Inscription, anti-clockwise *-SA TA (KA) NI-* Rev: Ujjain symbol, double circle with pellets.	SAN-1
512	Lead Circular	20	2·268	Obv: Crescented, three arched hill with chisel base over horizontl line. Inscription. anti-clockwise from IV: *RA NO SI RI SA TA-NI SA* Rev: Ujjain symbol, double circle with pellets.	SAN-1
520	Lead Circular	21	2·102	Obv: Crescented, three arched hill with chisel bse over horizontal line. Inscription, anti-clockwise: *-(NO) SI- - (NI) -* Rev: Single orb, double circle with pellet.	SAN-1
Type 4 v					
85	Lead Circulae	18	4·802	Obv: Crescented, three arched hill with chisel base over wavy line. Inscription, anti-clockwise from III: *(RA) NO SI - (SA TA)-NI SA* Rev: Ujjain symbol with pellets.	SAN-1

1	2	3	4	5	6
Type 4 vi					
17	Lead Oval	21×19	3·427	Obv: Crescented, three arched hill with chisel base over wavy line, in an incuse. Inscription, anti-clockwise: - - -*SA TA (KA* Rev: Ujjain Symbol, double circle with pellets.	SAN-1
517	Lead Circular	20	2·081	Obv: Crescented, three arched hill with chisel base over wavy line. Inscription, anti-clockwise: - - - - SA TA... Rev: Ujjain symbol, double circle with pellets.	SAN-1
192	Lead Circular	15	1·940	Obv: Three arched hill with chisel base over wavy line. Inscription, anti-clockwise from IV, partly off flan : *RA NO (SI)* - - - - *(NI) SA* Rev: Part of Ujjain symbol, double circle with pellets.	SAN-2
Type 4 vii					
18	Lead Circular	20	3·050	Obv: Upper section of crescented three arched hill, in an incuse. Inscription, anti-clockwise, partly off flan: *-NO SI—SA...* Rev: Ujjain Symbol, double circle with pellets.	SAN-1
Type 4 viii					
1	Lead Circular	16	2·259	Obv: Crescented, three arched hill over a horizontal line. Inscription, anti-clock wise from IV: *-NO SI RI SA (TA KA NI SA)* Rev: Ujjain Symbol with thick pellets.	SAN-1
2	Lead Circular	16	1·391	Obv: Crescented, three arched hill with chisel base over horizontal line.	SAN-1

1	2	3	4	5	6
				Inscription, anti-clockwise: *(RA NO) — SA (TA) - (NI) ...* Rev: Ujjain Symbol with thick pellets.	
Type 4 ix					
601	Lead Circular	22	6·261	Obv: Crescented, three arched hill with chisel base. Inscription, anti-clockwise: *(SI)-SA TA - - -* Rev: Ujjain symbol, double circle, with pellets.	SAN-8
Type 4 x					
498	Lead Circular	19	2·931	Obv: Crescented, three arched hill over wavy line. Inscription partly off flan: *RA NO..* Rev: No detail visible.	SAN-1
603	Lead Oval	17×14	4·046	Obv: Crescented, three arched hill over wavy line. Inscription, anti-clockwise, off flan : *(RA NO)...* Rev: Part of Ujjain symbol double circle with pellets.	SAN-8
Type 4 xi					
457	Lead Oval	23×10	2·071	Obv: Traces of inscription. Rev: Part of Ujjain symbol.	SAN-1
Type 5					
530	Lead Circular	18	1.670	Obv: Crescented, three arched hill over horizontal line. Inscription, clockwise: *—SA (TA)...* Rev: Part of Ujjain symbol, with thick pellet.	SAN-1

1	2	3	4	5	6
Type 6					
26	Lead Circular	18	2·628	Obv: Crescented, three arched hill with chisel base over horizontal line. Inscription, anticlockwise from III: *RAM NO (SI)-(SA TA KA) NI SA* Rev: Part of Ujjain symbol with thick pellets.	SAN-2
528	Lead Circular	19	3·426	Obv: Crescented, three arched hill with chisel base over horizontal line. Inscription, anti-clockwise from IV: *RAM NO SI RI SA TA (KA) NI (SA)* Rev : Ujjain symbol, double circle with pellets.	SAN-2
Type 7					
423	Lead Circular	20	3·598	Obv: Three arched hill with chisel base over horizontal line. Inscription, anti-clock wise: *—(PU) LU MA VI (SA)* Rev : Traces of inscription at edges, over struck with Ujjain symbol, with thick pellets.	SAN-1
444	Lead Circular	19	4·912	Obv: Crescented, three arched hill with chisel base over horizontal line. Inscription, anticlockwise: *—PU LA—* Rev: Traces of inscription,overstruck by Ujjain symbol, with thick pellets.	SAN-1
Type 8					
187	Lead Circular	17	3·231	Obv: Three arched hill over horizontal line. Inscription, clockwise : *RA NO... (NI) SA* Inscription, clockwise: *RA NO...(NI) SA* Rev: Single orb with pellet.	SAN-2
Type 9					
494	Lead Circular	17	2·314	Obv: Crescented, three arched hill with chisel base over horizontal line. Inscription,	SAN-1

1	2	3	4	5	6
				clockwise, unclear. Rev: Ujjain symbol, double circle with pellets.	
Type 10 i					
22	Lead Oval	13×11		Obv: Three arched hill over horizontal line, in an incuse. Rev: No detail visible.	SAN-1
81	Lead Circular	15	3·640	Obv: Three arched hill. Rev: Traces of Ujjain symbol.	SAN-2
533	Lead Circular	14	1·272	Obv: Crescented, three arched hill over horizontal line. Rev:Part of Ujjain symbol, double circle with pellets.	SAN-2
586	Lead Circular	14	2·345.	Obv: Traces of two horizontal lines. Rev: Ujjain symbol.	SAN-2
Type 10 ii					
21	Lead Circular	13	1·822	Obv: Three arched hill with chisel base over wavy line, in an incuse. Rev: Ujjain symbol with small pellets.	SAN-1
70	Lead Circular	14	1·421	Obv: Crescented, three arched hill with chisel base over wavy line. Rev: Crescented Ujjain symbol.	SAN-1
Type 11					
193	Lead Circular	13	2·723	Obv: *Triratna* symbol. Rev: Ujjain symbol with pellets.	SAN-2

1	2	3	4	5	6
Type 12					
194	Lead Circular	11	1·099	Obv: Triangular headed standard, in an incuse. Rev: No detail visible.	SAN-2
Type 13 i					
196	Lead Circular	6	1·163	Obv: Traces of Lion. Rev: Part of Ujjain symbol.	SAN-2
Type 13 ii					
587	Lead Circular	16	3·331	Obv: Unclear linear animal, facing left. Rev: Crescented Ujjain symbol.	SAN-2
Type 14					
88	Cu alloy Rectangular	16×15	1·822	Obv: Three arched hill over horizontal line. Rev: Ujjain symbol overstruck by triangular headed standard.	SAN-1
414	Cu alloy Square	16	1·649	Obv: Inscription, anti-clockwise: *RA NO - - (SA)...* Rev: Traces of Ujjain symbol, overstruck wih triangular headed standard.	SAN-1
416	Cu alloy Rectangular	18×16	1·199	Obv: Part of crescented, three arched hill. Inscription, anti-clockwise: - - *SI*– - Rev: Part of crescented Ujjain symbol.	SAN-1
460	Cu alloy Irregular	15×13	0·426	Obv: Three arched hill over wavy line. Rev : Part of Ujjain symbol.	SAN-1
497	Cu alloy Square	16	2·634	Obv: Crescented, three arched hill with chisel base over wavy line. Insription	SAN-1

1	2	3	4	5	6
				off flan. Rev: Ujjain symbol with thick pellets.	
518	Cu alloy Square	16	2·599	Obv: Crescented, three arched hill over horizontal line. Inscription, anti-clock wise: *RA NO (SA)* ... Rev: Ujjain symbol with pellets, overstruck by triangular headed standard in an incuse.	SAN-1
Type 15					
476	Cu alloy Circular	17	2·840	Obv: Bull, facing right, over triangular headed standard. Inscription, clockwise: unclear. Rev: Ujjain symbol.	SAN-1
Type 16					
191	Cu alloy Circular	13	1·519	Obv: Elephant facing left. Rev: Crescented, three arched hill.	SAN-2
604	Cu alloy Circular	15	2·904	Obv: Elephant facing left Rev: Crescented, three arched hill.	SAN-8
Type 17					
188	Cu alloy Oval	12×10	1·511	Obv: Traces of animal. Rev: Ujjain symbol with pellets.	SAN-2
Type 18					
504	Cu alloy Irregular	16×15	0·782	Obv: Punched symbols, unclear Rev: Part of Ujjain symbol.	SAN-2
Type 19					
592	Ag/Cu Retangular Punch marked	13×15	2·973	Obv: Sun, animal and two unclear symbols. Rev: Fish in tank?	SAN-2

1	2	3	4	5	6
Unidentifiable lead coins					
4	Lead Oval	21	4·459	Obv: Traces of symbols. Rev: Traces of Ujjain symbol.	SAN-1
27	Lead Circular	13	1·728	Obv: No detail visible. Rev: No detail visible.	SAN-2
68	Lead Circular	13	1·465	Obv: Unidentifiable symbol. Rev: Ujjain symbol with thick pellets	SAN-2
189	Lead Circular	15	2·821	Obv: Traces of symbol, in an incuse Rev: Traces of Ujjain symbol.	SAN-2
195	Lead Oval	13×11	1·426	Obv: No detail visible. Rev: No detail visible.	SAN-2
Unidentifiable copper alloy coins					
11	Cu alloy Square	10×10	1·021	Obv: Traces of symbols. Rev: Single orb.	SAN-2
110	Cu alloy Rectangular	11×9	0·889	Obv: No detail visible. Rev: Single orb with pellet.	SAN-2
185	Cu alloy Rectangular	12×10	0·554	Obv: Traces of symbols. Rev: No detail visible.	SAN-2
195	Cu Alloy Rectangular	14×6	1·115	Obv: Traces of symbols. Rev: No detail visible.	SAN-2

CHAPTER VII

SCULPTURES

A. MEMORIAL STONES

The majority of the sculpture found from Sannathi are memorial slabs. The slabs are approximately 0·60 metres in width and 0·10–0·20 metres in thickness. The height of the slabs varies, as no complete piece has been recovered. However a complete slab was recovered by the Department of Archaeology and Museums of the Government of Karnataka, and is on display in the Government Museum, Gulbarga. It measures approximately three metres in height.

The slabs are divided into a series of panels. The top panel is arched and decorated with a series of tiered roofs with *chaitya* arched windows. In some examples human figures are depicted in these windows. The second panel carries a portrait of an individual or couple, presumably the persons commemorated. The central figures are usually flanked by attendants. A label inscription is sometimes given above or below this panel. The third panel usually has one of two depictions. The most common is of an unyoked bullock cart, with the bulls at rest in front of it. The driver of the cart is sometimes also portrayed. Alternatively the scene can be of a horse, without a rider, usually being led by groom and occasionally preceded by an attendant carrying an umbrella. The bottom of these panels is undecorated, at time for depth of exceeding one metre. This portion was probably buried in the ground, in order to stabilise the standing stone.

Evidence from the platform at the southern side of the excavated mound suggests that these memorials might have been set up around the mound. There is some question over the purpose of these sculptures. They have been thought to be of Buddhist origin, with the riderless horse scene being interpreted as the great departure of the Lord Buddha. Evidence for a Buddhist presence at Sannathi is the Buddha *pada* sculpture set up in front of the Chandralamba temple, and the interpretation of the mounds as stupas. A second interpretation of the sculptures is as memorial pillars, with the unyoked bullock cart and the riderless horse scenes being interpreted as representations of the end of a journey, in this case the journey through life of the figure commemorated.

A catalogue of the fragments recovered during explorations is given below, listing first those slabs with more than one panel surviving, and then the examples where only one panel is identifiable.

(i) Multiple panelled sculptures

Acc. No.

272 Fragment of a sculpted slab in four panels. The broken top portion depicts a railing motif, below which is a single line donatory inscription. The main panel has a central female figure, with ear ornaments, bangles, anklets and girdle, seated on a cane seat, with one foot lowered onto a foot stool. Four female attendants flank the figure carrying (clockwise from bottom left) a box, a fly whisk, a water jug and mirror. The lowest panel is broken, but is flanked by two columns (pl. XXI A).

273 Lower fragment of a sculpted slab. The slab has two panels. In the upper panel the legs of a seated figure, with an attendant to the right, can be seen. In the lower panel there is a bullock cart, with driver and unyoked bulls (fig. 18; pl. XXII A).

275 Sculpted slab in two panels. The top panel is arched and depicts a vaulted roof, with three *chaitya* windows in two tiers, and railings. The lower panel is framed by columns with capitals, and shows a female figure seated on cane stool. Her garment covers her left breast and is gathered at the left shoulder. She has a necklace, ear ornaments and bangles. In attendance are two standing female figures holding a jug(left) and a fan (right). Both figures have girdles and drapes around their lower bodies, and have ear ornaments, armbands and bangles. At the bottom of the panel is a railing (fig. 19).

279 Fragment of a sculpted panel, with part of two panels surviving. In the upper panel there is a seated figure flanked by two attendants. The attendant on the right holds a flywhisk. The lower panel shows part of an unyoked bull.

318 Fragment of a sculpted slab in two panels. The upper panel shows the lower half of a human figure sitting on a raised seat. A small figure is kneeling to the right, and to the left are traces of another figure sitting crossed legged. On the lower panel is an unyoked bull and part of a bullock cart.

325 Fragment of a sculpted slab with two panels. The upper panel depicts a raised seat and the lower a pair of unyoked bulls.

332 Fragment of sculpted slab in two panels. Only the leg of a chair survives in the upper panel. The lower panel depicts an unyolked bull and part of the yoke of a bullock cart.

336. Fragment of a sculpted slab with two panels. In the upper panel there is an unyoked bull and the shaft and yoke of a bullock cart. In the lower panel there are the heads of two male figures. The figure on the left is carrying a staff over his shoulder (fig.21).

348 Fragment of a sculpted slab in two panels. The upper panel has a set with an attendant standing to the right and a small figure is kneeling in front. The lower panel has a covered bullock cart.

375 Fragment of a sculpted slab in two panels. In the upper panel there is a child seated on a woman's knee. In the lower panel there is the top of a covered bullock cart.

376 Fragment of a sculpted slab in two panels. The upper panel has the bottom of two *chaitya* windows above a railing. The lower panel portrays the heads of three female figures two of which are carrying pots at their shoulders and may be attendants (pls.XXI B and XXIII A).

FIG. 18 : *Fragments of memorial slabs*

394 Fragment from the right side of a sculpted slab, divided into two panels. In the upper panel there is a *chaitya* window and in the lower panel a female figure with an attendant (pl. XXIV A).

420 Large fragment of inscribed sculpted slab in two panels. The upper panel portrays a seated couple. The male figure is resting his hand on the thigh of the female, who in turn has her hand on his shoulder. The male figure wears bracelets and the female has bracelets, a necklace, ear ornaments and anklets. The figures are flanked by two standing attendants. A railing motif separates this panel from the inscription below. In the lower panel an attendant carrying an umbrella proceeds a groom leading an unridden horse. The feet of the groom and the horse are missing. This slab might join Accession no. 421.

(ii) Chaitya arch panels

276 Upper portion of a sculpted slab, showing a roof structure with three *chaitya* arches in two tiers. There is a single plain window between the two arches on the lower tier (fig. 18).

277 Upper portion of a sculpted slab, showing a roof structure with three *chaitya* arches in two tiers. There is a single plain window between the two arches on the lower tier.

284 Upper portion of a sculpted slab or pillar bearing an incised *chaitya* window motif.

293 Fragment of a sculpted slab with part of a vaulted roof and a single *chaitya* window.

299 Fragment of a sculpted slab, with low relief representations of unidentifiable architectural elements.

304 Fragment of sculpture with low relief depiction of a railing or parapet.

312 Fragment of a sculpted panel showing a human head over a balcony railing.

314 Fragment of panel with incised depiction of a *chaitya* window and a part of a second.

315 Fragment of a sculpted panel showing a vaulted roof, supported by a pillar. On a lower tier a chaitya window and a part of a human head can be seen.

327 Fragment of sculpture with low relief depiction of a railing or parapet.

330 Fragment of a sculpted panel depicting a balconied structure with part of a central arched window, and a smaller window to the right. A human head is framed in the central window.

335 Fragment of a sculpted panel depicting a balconied structure with part of a central arched window. A human head is framed in the window.

349 Fragment of a sculpted panel showing a head inside an arched window. The figure wears thick ear ornaments. To the right of the arch is a second head.

390 Badly damaged fragment of sculpted slab in two panels. In the upper panel there is a single chaitya arched window. In the lower panel there are two obscured heads.

396 Uppermost fragment of a sculpted slab, depicting in relief three chaitya arched windows in two tiers.

338 Fragment of sculpture depicting a vaulted roof with *chaitya* windows.

351 Part of a sculpted slab with two panels. The top panel has part of a *chaitya* window. The outline of a lower panel survives, but without any detail.

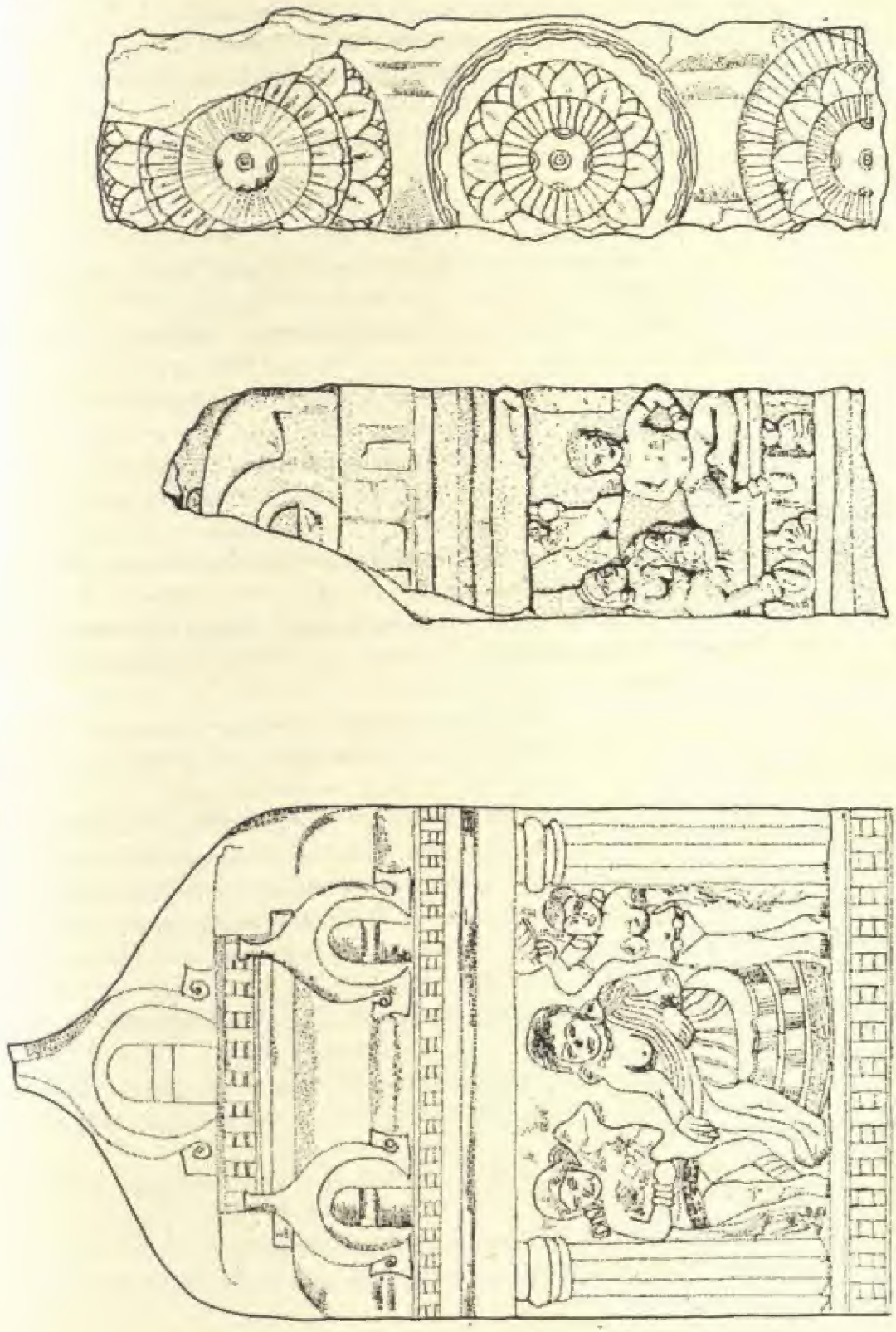


FIG.19 : *Sculptures from Sannathi*

377 Fragment of panel with low relief depiction of a *chaitya* window.

386 Fragment of panel with low relief depiction of a *chaitya* window.

391 Fragment of pillar with low relief depiction of a *chaitya* window, and traces of two further windows below.

401 Fragment of panel with low relief depiction of a *chaitya* window, supported by a pillar capital.

(iii) Donor portrait panels

267 Fragment of sculpted panel showing female attendant, with ornate headdress, holding a vase of flowers, of intricate design, in her raised left hand (fig. 20).

269 Fragment of a sculpted slab depicting a seated female figure with a baby on her lap, flanked by four female attendants (fig. 18).

274 Small fragment of a sculpted slab. Only one figure is visible, that of a headless, standing male with his right arm raised to shoulder level.

287 Fragment of a sculpted slab, depicting a kneeling man in front of a column on a pedestal.

288 Fragment of a sculpted slab, depicting the folded leg of a seated figure and a kneeling female attendant.

289 Fragment of a sculpted slab, depicting a seated male figure, with his right hand on his thigh. A figure at his right shoulder may be an attendant.

291 Fragment of a sculpted slab, depicting the torso of a female figure, with ornaments or drapes running diagonally across the body. To the left are traces of what might be a male figure to which the female is reaching.

292 Small fragment of a sculpted slab with part of a damaged inscription above a human head.

294 Fragment of a sculpted slab, depicting the torso of a female figure, sitting on a high cane seat. An attendant stands below.

300 Fragment of a sculpted slab with part of a female attendant, carrying an unidentifiable object at left shoulder. She has a waistband with folds of fabric draped to her knees.

302 Fragment of a sculpted slab showing the head of a female figure. She wears ear ornaments and a two stranded necklace. The body of an attendant is visible behind the figure (fig. 20).

303 Fragment of a sculpted slab, depicting a female head, with large ear ornaments, and substantial architectural elements (fig. 20).

305 Fragment of a panel showing a female head with hair parted above the forehead. She wears two spiral ear ornaments (fig.20).

310 Fragment of a sculpted panel showing the legs of a figure seated on a cushioned seat.

311 Fragment of a sculpted panel showing a human figure seated cross-legged with his left hand resting on his thigh.

313 Sculpted fragment showing the right thigh and the left leg of a human figure. There is an anklet on the leg.

316 Small fragment of relief carving, depicting a human head with the hair gathered at the back.

319 Fragment of a sculpted panel showing a seated female, with a baby on her lap. A small

figure is kneeling to the right.

320 Fragment of a sculpted panel showing a seated figure, with one leg resting on a foot stool. To the left is part of a standing figure.

322 Fragment of a sculpted panel depicting two mutilated female heads between two pillars and above three horizontal lines.

324 Part of a sculpted panel depicting fragments of two heads. One of the heads is female and wears discoid ear ornaments.

329 Fragment of a sculpted panel depicting a human body with only part of head surviving.

334 Fragment of a sculpted panel showing a seat raised on legs, and the right leg of a human figure seated on it.

344 Fragment of a sculpted panel depicting a sitting female and the torso of a female attendant to the right. Both figures wear armbands and bracelets.

345 Fragment of a sculpted panel depicting a couple seated on a raised bench. The right foot of the male figure is resting on a foot stool.

346 Fragment of a sculpted panel depicting a damaged head and a fan.

356 Sculpted fragment from the right side of a larger panel, showing the right arm of a figure from the shoulder to below the elbow.

358 Fragment from the left side of a sculpted panel. It depicts a seated female figure wearing ear ornaments and armbands. She has a girdle of circular links. To her left is the lower portion of a standing attendant.

387 Fragment from the right side of a sculpted panel, showing the hips of a single figure wearing garment made up of overlapping scales or links.

389 Fragment of sculpted panel showing the legs of a seated figure with an attendant whose palms are joined in the attitude of prayer or greeting.

393 Heavily pitted fragment of sculpted slab showing a female figure holding a lidded vessel.

395 Fragment of a sculpted panel depicting a couple, probably seated. The male on the right is holding up an unidentifiable object in his right hand. Between and behind the couple is a female attendant holding a fly whisk. A second attendant at the left of the group is holding a pot on each shoulder (pl.XXIII B).

402 Fragment of a sculpted panel showing the body of a figure with an attendant behind. To the right is the arm of a third figure.

403 Damaged fragment of a sculpted slab portraying the upper portion of a female figure and the arm of another figure to the right.

484 Fragment of sculpted slab, showing a male figure with a garment draped from his left shoulder.

(iv) Bullock cart panels

266 Bottom portion of a sculpted panel depicting a bullock cart with driver and unyoked bulls (fig. 21).

283 Fragment of a sculpted slab depicting a wheel and part of a covered bullock cart (fig. 21).

FIG. 20 : *Sculpture portraits from Sannathi*

309 Part of a sculpted slab depicting a bullock cart with unyoked bulls. A man is seated on the cart, with his right arm raised and his left hand resting on his thigh.

323 Fragment of a sculpted panel depicting a lying bull and part of a crossed legged human figure.

331 Fragment of sculpted panel depicting an unyoked bull and part of the yoke of a bullock cart.

347 Fragment of a sculpted panel showing a covered bullock cart with a man seated on the front and an unyoked bull (fig. 21).

371 Fragment of inscribed sculpted panel. The panel below the inscription portrays a standing figure with an unyoked bullock cart and the head of one of the bulls (pl.XXII B).

392 Dressed stone with unfinished carving. Possibly a depiction of a wheel.

(v) Horse panels

317 Part of a slab with an unfinished relief carving of a man standing with a horse. The back of the horse has laminated, and part of the scene is only incised. This suggests that the sculptor abandoned the work after a fault in the stone became apparent.

421 Largely undecorated fragment of limestone, except for the very top which has the lower legs of figures that have been lost. The figure on the right is human, but the three legs on the left are possibly not. These may be the legs of the groom and the horse at the bottom of the sculpture found close by in the excavation (Accession Number 420)

B. MEMORIAL PILLARS

These are similar to the memorial panels, but are narrower and deeper. They usually have only two panels, the *chaitya* arched roof and the donor portrait, with a label inscription below. They have also been interpreted as *ayaka* pillars (M. Sheshadri 1972; M. S. Nagaraja Rao 1985). It is possible that the deep post-holes in the corners of the platform at the south of the excavated stupa mound held such sculptures.

270 Upper fragment of a pillar with incised depiction of gable arched window.

271 Sculpted pillar with a *chaitya* window and railing at the top. The main panel depicts a couple seated on a long bench. The female figure has a baby on her lap. An attendant with a pot in her raised left hand, stands behind. There are two further small figures seated at the feet of the couple(fig.19).

290 Fragment of column or slab showing a female head, with large ear ornaments, framed in architectural elements (fig. 22).

340 Fragment of pillar slab with incised depiction of part of a *chaitya* window.

341 Top fragment of pillar slab with incised depiction of a *chaitya* window.

C. ARCHITECTURAL MEMBERS

Several fragments of architectural elements have been found, notably lotus medallion railing, which might have originally been associated with a stupa. They are catalogued below:

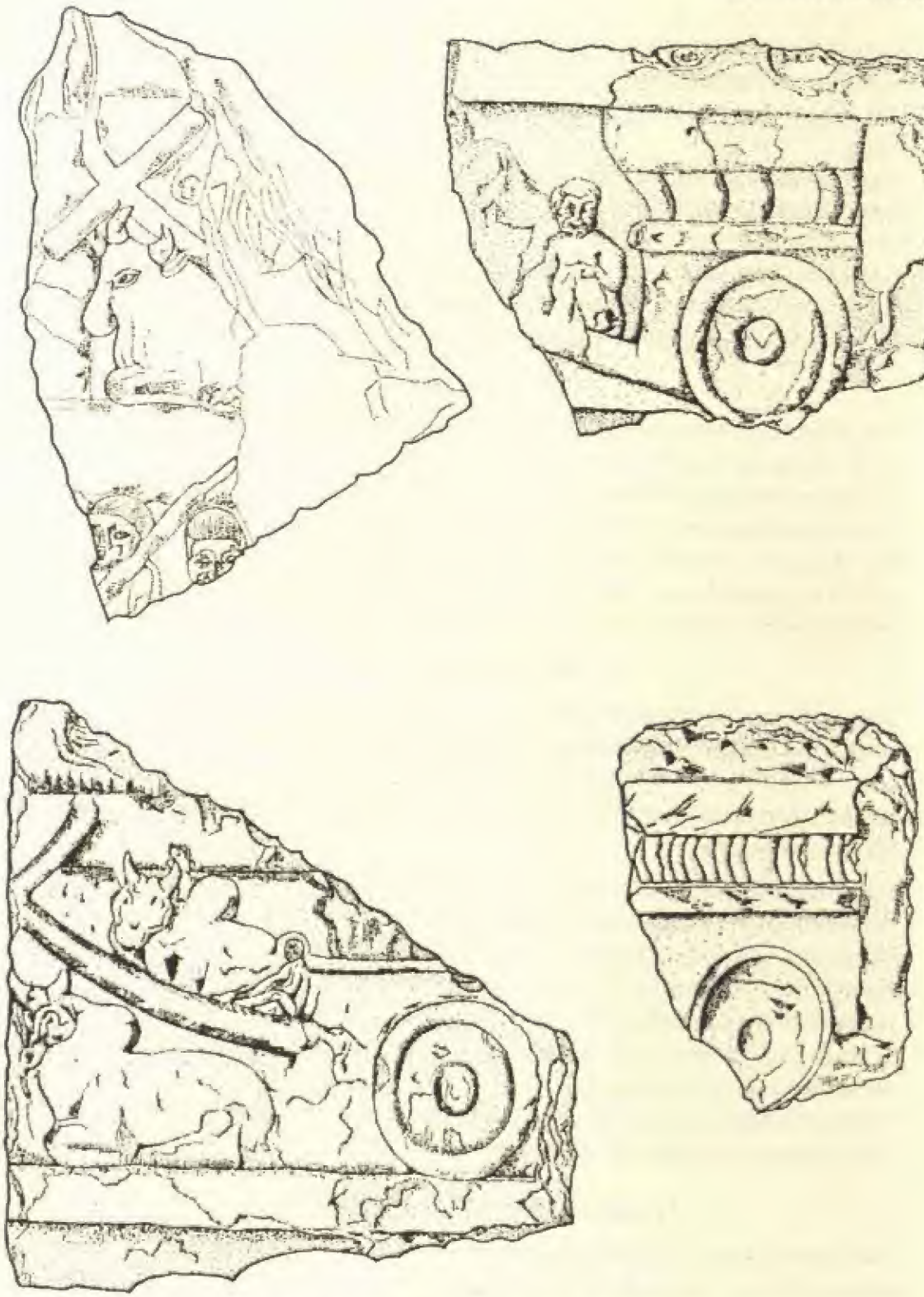


FIG. 21 : *Bullock cart panels from Sannathi*

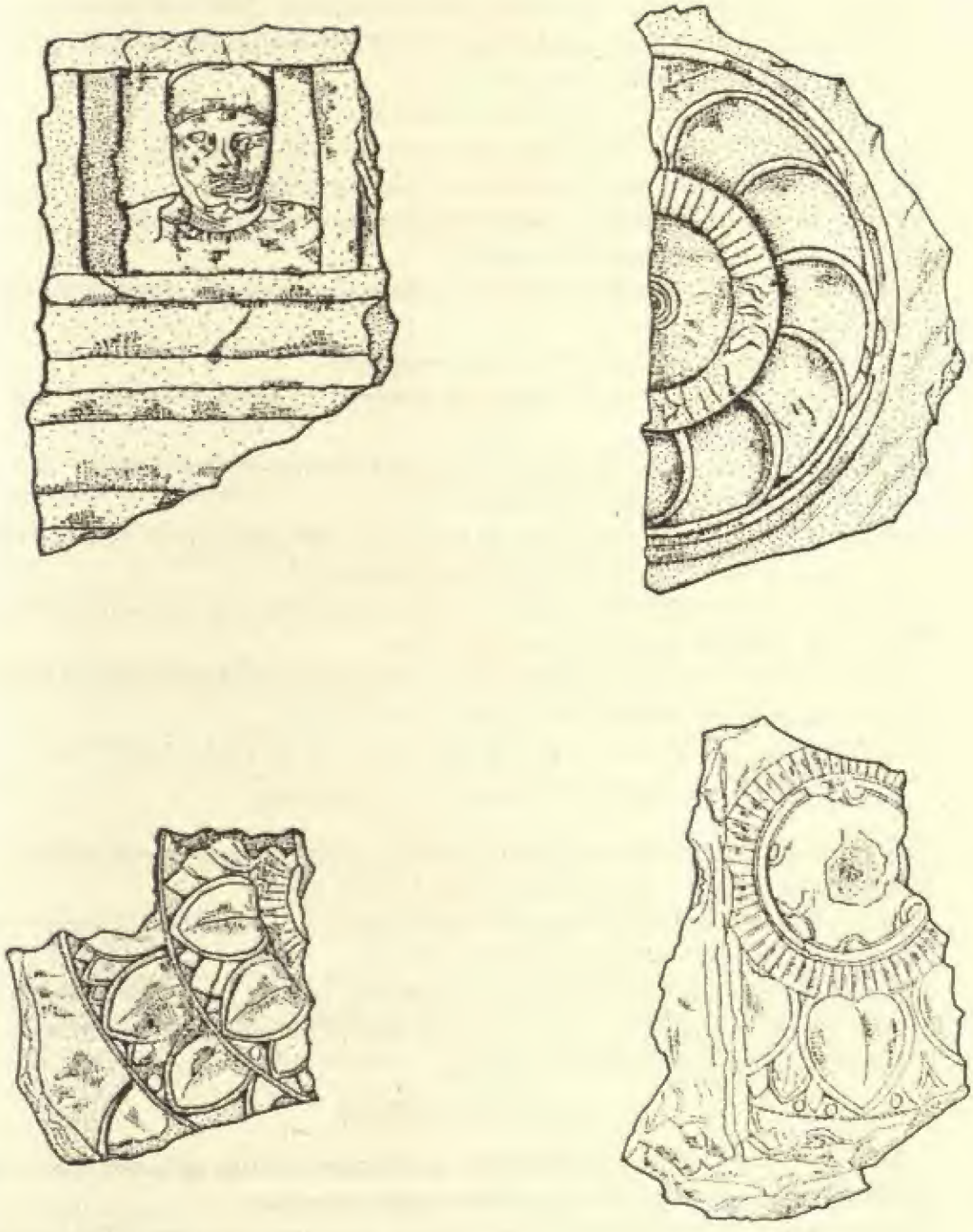


FIG. 22 : *Sculptures from Sannathi*

268 Fragment of railing pillar, with three lotus medallions. The oval mortices for cross members survive on the right hand edge of the fragment (fig. 19 ; pl. XXIV B).

295 Fragment of miniature column on pedestal.

298 Fragment of panel with low relief lotus medallion (fig. 22).

321 Fragment of panel with half of a low relief lotus medallion (fig. 22).

342 Fragment of pillar with lotus medallions on two sides (fig. 22).

350 Fragment of pillar base. A three stepped pyramid with rope mouldings.

352 Pillar fragment with unidentifiable motifs.

357 Circular pillar capital or base with a mortice on the bottom and a tenon on the top. It has a semi-circular profile.

359 Sculptural fragment with traces of a lotus medallion.

360 Three joining fragments with a device of concentric circles, possibly part of a lotus medallion.

372 Sculptural fragment, possibly depicting tree wih circular objects flanking.

373 Small fragment of decorative moulding.

397 Fragment of pillar. Lotus medallions can be seen on three sides, at the bottom of the pillar. At a higher level the corners of the pillar are chamfered.

398 Fragment of pillar or slab, decorated with a lotus medallion. The fragment has had several holes drilled through it, possibly at a later date.

399 Fragment of pillar. Lotus medallions can be seen on three sides at the bottom of the pillar. At a higher level the corners of the pillar are chamfered.

423 Fragment of a sculpted panel with low relief depiction of a lotus medallion.

D. FREE STANDING SCULPTURES

The following free standing sculptures were also collected during explorations :

296 Black granite head of a Brahmanical deity of a later period.

307 Fragment of a free standing sculptured human figure. Only the upper leg portion survives. The figure is draped in a hanging pleated garment.

355 Part of the torso of a pot-bellied dwarf. It is wearing a *dhoti* tucked into a waistband at the back and with pleats falling at the front. The base of the piece is provided with a tenon, presumably for its attachment to a setting.

E. OTHER SCULPTURE

This fragment with incised decoration is characteristically different from the other sculptures from Sannathi and is probably medieval in date.

281 Fragment with incised drawing of four figures, apparantly in combat. The central figure is on horseback, while the one to his left holds a shield. The other two figures are pulling a rope or a spear. The style of the piece suggests that it is of much later date than most of the other sculptural fragments from the site.

CHAPTER VIII

INSCRIPTIONS

More than fifty inscriptions from Sannathi, many of them fragmentary and dating from around the second century AD., have been published (G.S. Gai, ed. 1966-67 and 1968-69; M. Sheshadri, 1965; M. S. Nagaraja Rao, 1985). The most important of these refers to the Satavahana king Vasisthiputra Satakarni (G. S. Gai, 1968-9, App. B. No. 87). More recently an inscription has been found mentioning the name of a second Satavahana king, Gautamiputra Satakarni (I. K. Sarma, and J. V. Prasad Rao, 1990). The outstanding discoveries of Rock Edicts of Asoka on a rectangular granite slab, found in the Devi shrine of the Chandralamba temple complex (I. K. Sarma, R. V. Siva Sarma and J. V. P. Rao 1989; I. K. Sarma, G. V. Sreenivasa Rao and J. V. P. Rao 1989), further pushes the antiquity of the site from Satavahana to Mauryan times.

A further seventeen inscriptions were found during the 1986-89 excavation seasons at Sannathi. As with the earlier discoveries, many of these are label inscriptions on limestone memorial stones. Only one inscription was found from the excavated stupa site (SAN 1), while the remaining were collected from different localities in and around Sannathi village. The majority of the inscribed slabs have been reused to build stone bunds, either in the fields, or in the terraces beneath the Chandralamba temple, or in partition walls in the village. As a result most of the slabs are broken and the inscriptions fragmentary. Some were found lying below trees in the fields where they were being venerated as objects of worship by the local people. The inscriptions usually occur on sculptured panels, though a few are on plain slabs. Palaeographically they range between first and third century AD. The inscriptions are commemorative or donative in nature and issued by kings, royal officials, merchants and others. The inscriptions are listed below.

Acc. No.

272 A memorial slab, measuring 0·90 × 0·63 ×0·11m, found near the robbed out stupa (SAN 4). The middle panel and part of the bottom panel are preserved. The main portrait is of a seated female figure flanked by four attendants. Above this panel an inscription reads *Gami Kumariya Padama Sirikaya*. Dedicated to Padmasri of Kumara village, it is in mid-second century AD characters.

278 A rectangular slab, measuring 0·45 × 0·36 × 0·10 m, with pillar motifs at either side. It was found in the terrace walls surrounding the Chandralamba temple (SAN-6). The inscription is engraved vertically in one line and reads *Amanikaya*, a record of a donation in the name of Amanika. The script is datable to the first century AD (pl. XXV A).

280 Two characters of a label inscription on a limestone fragment measuring 0·28×0·36×0·12m, also found in the terrace walls surrounding the Chandralamba temple (SAN-6). They are *-Maya-*.

282 A broken slab with a pillar decoration on either side, measuring 0·58 × 0·47 × 0·15m, found in the terrace walls below the Chandralamba temple (SAN 6).The inscription is incised parallel to the pillar design, in a single line of small characters, and reads *Taga Bo (ti) nikaya* or *Taga Bo (gi) nikaya*. A record in the name of Botinika or Boginika and datable to first-second century AD (pl.XXV B).

285 Two line inscription on a fragment of a limestone slab, measuring 0·33 × 0·27 × 0.13m. It was also found in the terrace walls below the Chandralamba temple (SAN-6). The sides of the slab are incised with pillars, on a stepped pedestal. The inscription reads *Samalirikaya* and *Baviya*. It refers to a person by the name of Samalirika, and is second century AD characters (pl. XXVI A).

353 A limestone slab with a rounded top,measuring 0·94 × 0·33 × 0·12m found in the terrace walls below the Chandralamba temple (SAN-6). The top of the slab has a *chaitya* decoration. The letters are deeply engraved on the slab in a single line and read as *Siyapadaya*. A donatory inscription in the name of Svuyapada is datable to first century AD on palaeographical grounds (pl. XXVI B).

371 A fragment of the middle and lower panels of a memorial stone, measuring 0·42 × 0·24× 0·11m, found in the terrace walls below the Chandralamba temple (SAN-6). Only a small portion of the middle panel survives depicting a kneeling figure. The lower panel shows part of a bullock cart. There is a label inscription on the intermediate space with linear letters reading *Vaniyasa Khahasa*. This memorial stone records a merchant (Vanika) whose name was Khaha. It is datable to first century AD.

376 A broken memorial stone with parts of the top and middle panels preserved. It measures 0·50 ×0·36×0·19 m, and comes from the area known as *Benagutti* (SAN-3). The top panel depicts two *chaitya* windows with a single bar railing decoration below.The middle panel is also fragmentary, depicting three extant human figures, one of them carrying a pot with a lid. The inscription is very worn and the letters are not clear. It reads *(Dha) ramahasa* or *(Va) ramahasa*. It is a memorial label inscription mentioning the name of a person, Dharamaha. The characters appear to be early, at least first century AD.

394 A broken memorial stone with top two panels partly preserved, measuring 0·44 ×0·48 ×0·11 m from the mound SAN-8. The top panel is decorated with a *chaitya* window and the middle panel depicts two figures, perhaps attendants. The letters are engraved in linear fashion and read *Ja Siri Makasa*. Palaeographically assignable to first century AD, it should probably read *Raja Siri Makasa* and is therefore a memorial inscription of king Sri Maka of a royal family .

395 Fragment of a memorial stone from SAN-8, measuring 0·50 × 0·32 × 0·15 m. Only the portrait panel survives depicting a couple with two attendants who are carrying a vase and

a *chowri*. The inscription is engraved on the border above the panel and reads *Riniya Siri Khitaya Kapatanasa*. The letters are in first-second century AD characters. This memorial stone was raised in memory of Sri Khitaya. Riniya may be part of the word Ghariniya, which appears commonly in inscriptions from Sannathi, and means household (M. S. Nagaraja Rao, 1985, p.42, No. 9, pl. 63; p. 43, No. 16, pl. 71). In this case Sri Khitayaa would belong to the Kapatana household.

420 The memorial stone found during the excavation from context no. 131. It measures 1·07 × 0·58 × 0·20 m. Two panels of the slab survive. The upper panel portrays a seated couple flanked by two attendants, and the lower panel an unridden horse, led by a groom, preceded by an attendant carrying an umbrella. The label inscription, between the two panels reads *Amachaputasa Siyadatasa*. The inscription is in mid-second century A D characters. It records Sviyadatta, the son of Amachya who belongs to a royal family.

482 A triangular fragment of a broken slab, measuring 0·31 × 0·21 × 0·11 m, found in the terrace walls below the Chandralamba temple (SAN-6).It has four Brahmi characters in two lines and reads *Dhilaya* and *Sa* respectively. A part of a name ending with Dila, datable to second to third century AD.

529 A fragment of a limestone inscriptional slab, measuring 0·46 × 0·35 × 0·17 m, found in the compound wall of a house in Sannathi village (SAN-9). An inscription of at least six lines covers two faces of the slab (pl. XXVII). A medial symbol, in the form of a loop, below the fifth letter of the bottom line (*Va*), suggests that the inscription continued beyond the extant portion. The text of the inscription is not complete as the slab has been broken on both sides, in such a way that the beginning and end of each line is missing. The remaining portion reads *-Puta Siva Siri Pudu(ma), -(Na)su Kinadikesu Kadamula, -Ya Ya -Talasa, Tapana Karetena Navasi, Atapasanava Navasitava Tarapa(la),* and *Tavo Sudhavasikena Bkarati Parivuth.* The first available line of the inscription mentions the name of the Satavahana King Sivasiri Pulumavi. It should be noted that there is a concentration of inscriptions of Vasisthiputra Sivasiri Pulumavi in northern Karnataka. He raised a memorial stone, in the memory of his queen Mahadevi, at Banavasi in North Kanara District, about 240 km south of Sannathi (A. V. N. Murthy and H. R. Ragunatha Bhatta, *JESI*, Vol 1, pp 34-39). A second inscription comes from Vasana in Nargund Taluk of Dharwar District (M. J. Sharma, *Epigraphica Indica*, Vol. XLI, pp. 154-158). A very small fragment of an inscription, reading *Ya Lasa*. _ Fragment of a memorial stone with fragmentary label inscription over the middle panel. It reads *Arakachhatko*. The letters are elongated and belong to first - second century AD. The name of Araka figured in two label inscriptions previously published from Sannathi (M. S. Nagaraja Rao, 1985. pl. 62 & 72 pp. 42, 43). The Chata or Chada, probably an awning, was erected by, or in the memory of, Araka. Three characters of an inscription, reading *Ya Chata* As with the above inscription, this fragmentary text may refer to the erection of an awning. Fragment of a sculputre with part of a label inscription preserved in the space between two panels, which reads *Rudupa(la)*. It is in second century AD characters.

Two further unpublished inscriptions have been discovered at Sannathi, since the end of the

excavations, and have not been removed or accessioned (These discoveries were made by Mr. J. Vara Prasad Rao, Assistant Archaeologist of the Hyderabad Circle of the Archaeological Survey of India).

1. A memorial label inscription in second century AD characters, to be found in front of one of the village houses at Sannathi. The text reads *Nanasa Yaraya*.
2. Fragment of limestone slab, perhap part of a memorial slab. It was found from the SAN-8 mound, close to the point where the inscription of Gautamiputra Satakarni was found. The label inscription reads *Mahanasikasa*. The text is in mid second century AD characters, and refers to one Mahanasika.

CHAPTER IX

OTHER FINDS

There are four other classes of finds from Sannathi, which still have to be discussed. These are the jewellery, the other copper alloy objects, the terracottas and the iron objects.

A. JEWELLERY

A significant proportion of the antiquities discovered, both in excavation and exploration, can be classed as jewellery. There are four main types of find in this classification, namely bangles, rings, ear studs and beads. In addition to these a jewellers mould, made of stone was discovered in the Ranamandala area. This stone tablet has a series of carved lines running along its length, and is therefore probably for making gold, silver or copper alloy wire. It also has a series of holes to facilitate the pouring in of the molten material, and peg holes to attach it to the other half of the mould. Another indication of fine metal working at Sannathi was the discovery of two small copper alloy crucibles (Accession nos. 584 & 597). The two bucket shaped recepticles are only 20mm in depth, and would therefore only hold very small quantities of the molten metal. A. Sundara in his excavations in the Ranamandala area discovered a small hearth which he suggests is that of a coppersmith (A. Sundara 1986-7).

(i) Bangles

The most common type of bangle found is made of shell, but examples in terracotta and glass were also found (pl. XXVIII A). The shell jewellery industry was well developed at Sannathi, with the entire site liberally strewn with shell bangles, rings and beads, as well as partially worked shell cores. The shell bangles are very plain, square or rectangular in section, with occasional rounding or chamferring of the edges. The glass bangles are generally circular in section, with one exception which is D-shaped (Accession no. 75), and are blue, green and yellow in colour. One fragment (Accession no. 411) is red on the surface but where it is broken it can be seen to be white inside. Two terracotta bangles were found in the Ranamandala area (SAN 2), the first of these is spiralled (Accession no. 25), whilst the second (Accession no. 207) is fluted.

(ii) Rings

In all twenty-two rings, or ring fragments were found, seventeen of which came from the excavation (pl. XXVIII B). The rings are of two main types, complete rings which are probably finger rings, and open ended copper alloy rings, which may be toe rings. The finger rings are found in a variety of materials. There are six shell rings, three of which are plain. A fourth (Accession no. 107)

is decorated with inscribed lines. The remaining two (Accession Nos. 108 & 161) have raised faces and decorated bands. Very similar to these is a carved carnelian ring, with high shoulders below the face which have been decorated with fine incised lines.

The rest of the rings are made of copper alloy, five of them being an alloy of copper and gold (Accession nos. 53, 487, 491, 492, & 493). Of these Accession no. 53 is the finest example. It is a toe ring with open ends, and one edge of it is crenellated. The outside of the band is decorated with a series of incised lines running around the ring. Of the unplated copper alloy ring Accession nos. 45 and 182 are the most delicately crafted. Although none of the rings have settings for stones, one small rectangular fragment of rock crystal was found, which may represent a ringstone or an intaglio.

(iii) Ear Studs

There are three ear studs, made of stone, shell and a lead/tin alloy (pl. XXVIII A). The largest of these is fifteen milimetres in diameter. Two more objects might also be interpreted as ear studs (Accession nos. 74 & 384), having approximately the same spool shape. However these are both considerably larger, with diameters of up to thirty-seven milimetres. However their large size should not necessarily discount them, since a study of the sculpture and the terracotta figurines show that very large ear ornaments were worn. They are however both made of lead, and it seems likely that some other explanation is required for them.

(iv) Beads

Beads are the most common type of artefact found at Sannathi (pl. XXIX). Two hundred and eighteen beads in eleven different materials were found. The most frequent materials used are shell, agate or carnelian and glass, but there are also beads of jasper, lapiz lazuli, amethyst, rock crystal, bone, clay and terracotta. On examination there were found to be twenty-five distinct types of bead shape. The shapes of the beads are not always confined to a single material, but occur in several different materials (fig.23)

B. COPPER ALLOY OBJECTS

The identifiable copper alloy objects include three kohl applicators, with long shafts and bulbous ends, and a long pin (147 mm) with a square head (pl. XXX A). Four copper alloy artefacts from the excavation (Accession nos. 469, 473, 477 & 479), were found in close proximity to each other, within the same context, indicating that they are possibly fragments of a larger object. Each fragment is formed from thin copper alloy sheet, was bent to give a convex outer surface decorated with a series of fine horizontal lines. All the fragments display a slight curvature. Four fragments of thin copper alloy sheet with perforated edges (Accession no. 474) were also found adjacent to the curved segments. Cleaning of these artefacts revealed that they were all an alloy of copper and gold. It would seem possible that the fragments were part of a frame or an edging for a box or a composite object having a wooden base.

There are also five cast copper alloy discs, with the crescented three arched hill symbol on them

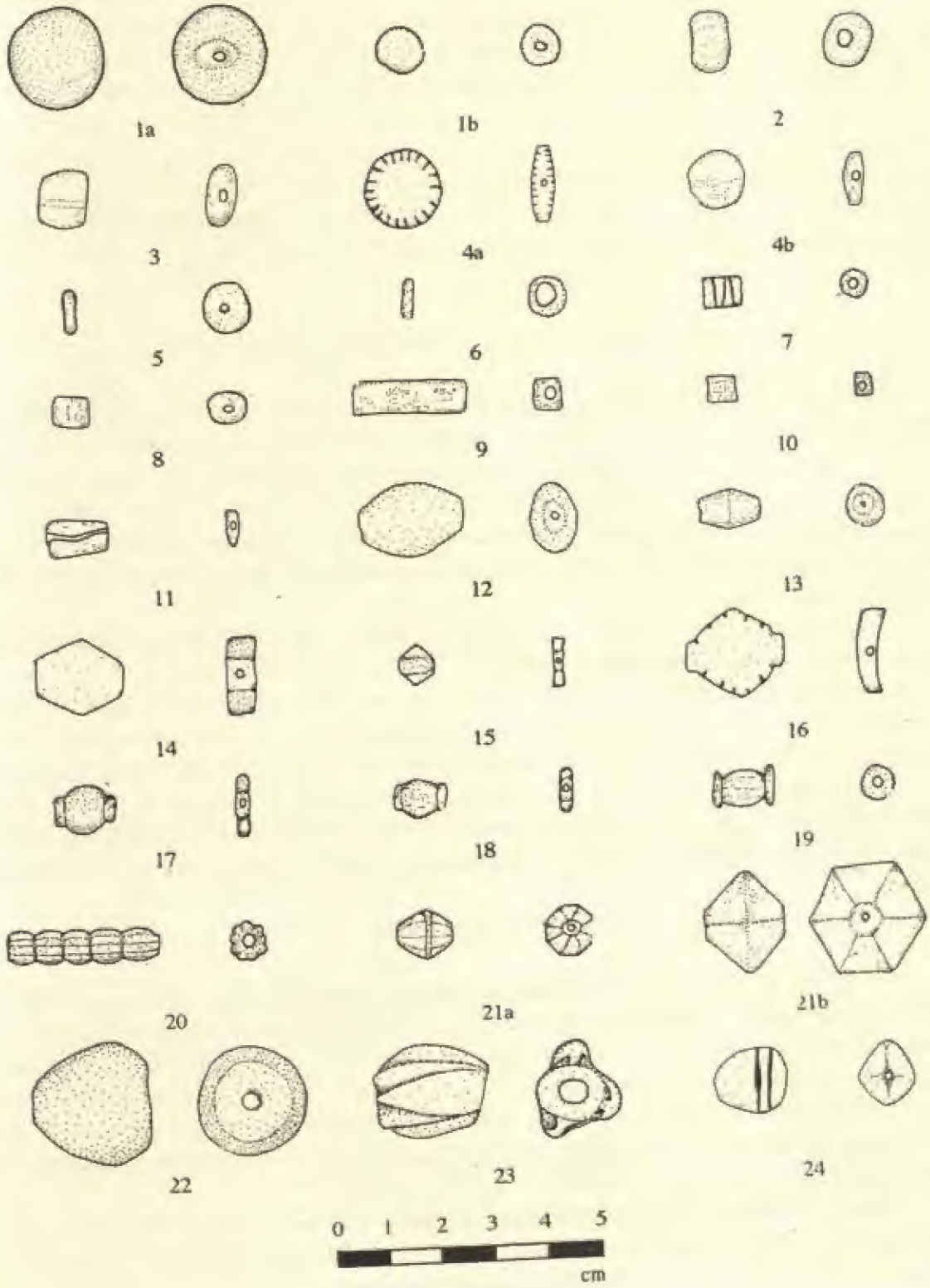


FIG. 23 : *Bead types*

(pl. XXX B). This symbol is commonly associated with coins, but in this case it is quite clear that no attempt has been made to cast, or subsequently to inscribe, any symbols onto the reverse. Alternatively they might be pendants, as suggested by the clear lug at XII o'clock on one (Accession no. 585). However examination of others (Accession nos. 598 & 600), show that there are several of these around the circumference of the disc and therefore that this is not a lug for suspending a pendant, but residual traces of the casting procedure. It should be noticed that in one case (Accession no.599), these lugs have been removed, which might suggest that the rest are unifinished. The discs are generally heavier than the coins found at Sannathi, weighing between 4·98 and 8·75 grams and all seem to be the same size, 23 mm in diameter.

C. TERRACOTTA FIGURINES (pl. XXXI ; fig. 24)

From the earliest exploration at the site, it was known that there was a thriving terracotta figurine industry. The Department of Archaeology and Museums of the Government of Karnataka, has an excellent collection of terracottas from Sannathi, including human and animal representations. Most of these are of the double moulded variety which are common from all Satavahana sites. During explorations, especially in the raised inner citadel or Ranamandala area (SAN-2) many more terracottas were discovered. Ten heads, all with elaborate hairstyles, seven feet, and six other body fragments were found.

Two other figurines are worth mention here. Unlike the afore mentioned fragments, these are not made with the double moulding technique. The first piece (Accession no. 77) is the torso of a mother goddess figure, with broad hips and crude arms. The head and extremities of the limbs are all broken. The second piece is a plaque with a semi-circular top. In relief on the front of the plaque is the head and body of a male figure (Accession no. 499). The facial features are not clear.

Other objects were also made of terracotta. There are two fragments of wheels, presumably from children's toys (Accession no. 218 & 413). There is also a tablet bearing seven parallel rows of indentations on each side. The purpose of this tablet is not clear, though it may be a scouring block.

D. IRON OBJECTS (pl. XXXII)

During the course of excavation thirty-one fragments of iron nails were found. The relatively small number found, compared to the number of tile fragments found, suggests that iron nails were not used for affixing tiles to a roof. This might have been achieved using wooden pegs, which would account for the large size of the holes found in the tile fragments. The state of preservation of the iron is not bad, so in certain deposits, where the proportaion of tile fragments was particularly high, such as those associated with the later structures to the north-east of the mound, one would have expected a far greater number of nails to survive.

Other iron objects include a long sewing needle with an eye, measuring 95 mm in length (Accession no. 448), and an iron spear-or arrow-head, 78 mm in length (Accession no. 488). Numerous other unidentifiable iron objects were also found.

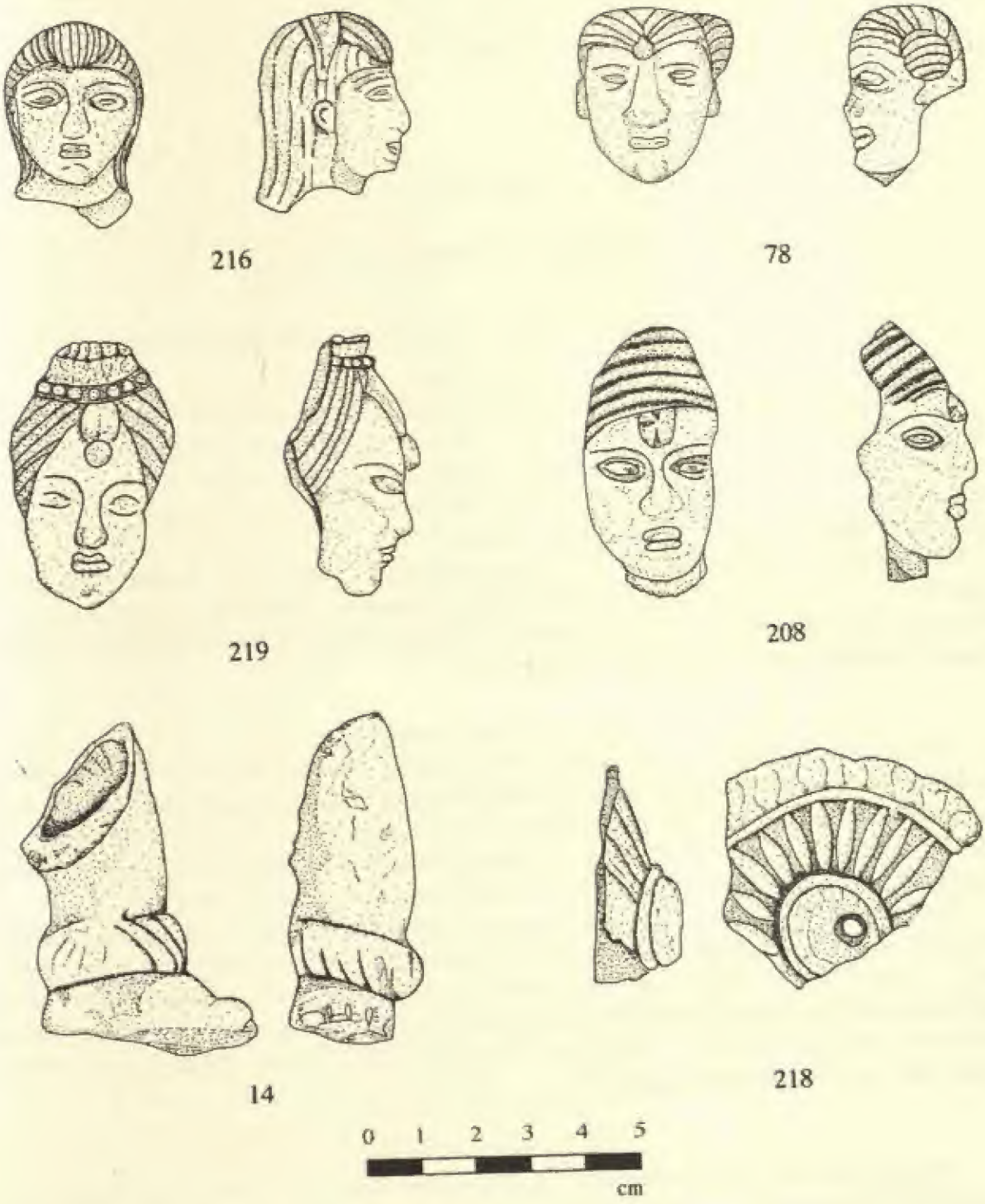


FIG. 24 : *Terracottas*

CHAPTER X

ARTEFACT CONSERVATION

A. CONSERVATION OF THE EXCAVATED MATERIAL

(i) Introduction

The range of material uncovered during excavation and exploration work at Sannathi is typical of that for most terrestrial, non waterlogged sites. The state of preservation varied greatly, but on the whole most artefacts appeared to be quite stable. Predictably no organic material had survived, with the exception of a small number of bone beads discovered during exploration work. As such a relatively simple conservation strategy was devised.

The lack of a constant supply of clean water and electricity, together with limited working space made the establishment of an 'on site' conservation laboratory impractical. The emphasis during exavation was therefore, on documentation and passive conservation, in the form of correct supportive packaging and stable storage conditions.

(ii) On site documentation

A simple but comprehensive documentation programme was devised as the main emphasis of the conservaion strategy was to be on maximum information retrieval. It was evident from the outset that not all artefacts would require, or undergo an active programme of conservation and in many cases the initial documentation would be the only record made for the permanent archive. Detailed records made at this stage may also assist in the future treatment of an artefact.

Each artefact was recorded in a site accessions register and assigned an accession number. A simple accession card (fig. 25) was completed for each object after a preliminary examination had been carried out. The accessions card contains the excavation data for each artefact together with an identification of the object, the material type, plus a record of the appearance and condition, and any technological details which were visible prior to cleaning. A simple drawing of the artefact was made on the card and a record photograph taken.

(iii) On site packaging

Any artefact which has survived burial has done so because it has reached equilibrium with it's surrounding environment. On excavation this equilibrium is destroyed and the artefact is exposed to abrupt changes in it's ambient temperature and relative humidity, and is allowed access to increased supplies of light and oxygen. Deterioration will begin again almost immediately, although it may not become apparent for some time. It is essential therefore, that some passive conservation steps are taken on site to enable the artefacts to establish a new equilibrium with their post excavation

ARCHAEOLOGICAL SURVEY OF INDIA	SITE	YEAR	ACCESSION NO.
SOCIETY FOR SOUTH ASIAN STUDIES	CONTEXT NO.	GRID CO-ORDS	
SMALL FIND ACCESSION CARD	ACCESSIOED BY		DATE
SMALL FIND NO. △	DISCOVERED BY		DATE
DESCRIPTION Material Colour Length Breadth Thickness / Height Weight % of whole Condition poor < 1 2 3 4 5 > good			
PHOTOGRAPHS B / W Date Cat Nos.		COLOUR Date Cat Nos.	
REFERENCE NOS.			SKETCH OVERLEAF

FIG. 25 : *Small find accession card*

environment. This is easily achieved by providing correct packaging and storage for each type of material.

All the material from Sannathi was relatively dry on excavation. The more robust artefacts were placed in self seal polythene bags and the excavation data recorded on the 'write-on panels' with a permanent spirit based waterproof marker. A spun-bonded polyethylene label recording all the excavation data was included in each bag. The metal artefacts were packaged in the same way, but the bags were pierced to prevent the objects 'sweating' and the onset of renewed accelerated corrosion. The more delicate artefacts were packaged in the same way, but the bags were padded with ridged polyethylene foam to provide support.

The individually packaged finds were packed in labelled, air tight polyethylene containers with self seal lids according to material type. Any gaps were filled with polethylene foam to prevent the contents moving during transit. Whilst on site these containers were kept in a cool, dark environment to prevent damage caused by extremes of temperature.

Only inert materials were used for packaging in an attempt to minimise post excavation corrosion. Materials such as paper and cotton wool were not used as they are hygroscopic and absorb moisture from the atmosphere, thus providing ideal conditions for renewed corrosion. In the case of the lead antiquities such materials are particularly harmful as they contain organic acid radicals which cause a massive increase in the rate of corrosion if they are allowed to come into contact with the artefact.

The relative humidity levels in each box were controlled by the inclusion of pre-packed bags of self indicating silica gel which aimed at maintaining the RH at approximately 55%.

(iv) Conservation

Following discussions with the excavators a number of artefacts were selected to undergo further conservation treatments. These included the metal artefacts which were felt to be most at risk unless actively stabilized, and those artefacts which required some cosmetic treatment for inclusion in the final report.

A system of maximum information retrieval through in depth investigative cleaning, coupled with a policy of minimum intervention was adopted. In the past the concept of reversibility has dictated the methods of conservation employed in the treatment of antiquities. This is now seen to be an unrealistic aim as all treatments are to a certain extent irreversible, and this has led to the adoption of minimum intervention as a more practical objective. The most important criterion is that the process of conservation should interfere as little as possible with the true nature of an artefact.

1. Documentation

A seperate system of documentation was devised for those objects undergoing conservation. Each artefact was registered in a conservation register, assigned a lab number, and a separate lab card filled in for each (fig. 26). The conservation lab card was designed to accomodate the scientific and technological details recorded during the initial laboratory examination of the object, and to give specific details of any treatment carried out. Such records are essential as they record the level of

interference for future analysts and specialists. This written record was accompanied by post treatment drawings and photographs.

2. Initial examination

All the artefacts recieved in the lab were carefully examined using a binocular microscope at a magnification of approximately X10, before any course of treatment was embarked upon. This is the only occasion on which most objects are examined in such detail and it is important for both recording and treatment purposes. Details relating to the condition of the object, the nature of its corrosion products and any associated adhering material were noted on the conservation lab card. This information was vital in deciding upon the course of treatment for various artefacts.

3. Lead coins and artefacts

All the lead antiquites appeared to be stable with no evidence for active corrosion, although the extent of preservation differed for individual artefacts. Most of the objects seemed to have a good metal core, a supposition based entirely on their weight , and a surface coating of compacted white corrosion products stained brown by the soil. As the artefacts seemed typical of buried lead objects it was presumed that the corrosion crust was composed of cerrusite-lead carbonate ($PbCO_3$) and/or hydrocerrusite-basic lead carbonate ($2PbCO_3$. $PbOH_2$), both of which form slowly in the presence of air and water. The carbonate corrosion layer is stable and protects the object from further decay, but at the same time it tends to obscure surface detail. Topographical details may be preserved either in this corrosion layer or in the underlying metal core. Careful examination had shown the latter to be the case for all the lead antiquities from Sannathi, although the metal surface was extensively pitted and cracked in most instances. Embrittlement of the remaining metal core had occured where the corrosion had penetrated deep into the lead via the grain boundaries. Some of the artefacts appeared to have a uniform red/brown layer immediately below the carbonate crust covering the surface of the metal. This was presumed to be litharge-lead oxide (PbO).

Chemical cleaning methods are usually employed in the cleaning of lead antiquities as the metal is very soft and surface detail may be damaged by mechanical techniques. The absence of an 'original' surface within the corrosion layers also makes mechanical cleaning very difficult. Undoubtedly the best method for cleaning lead is to remove the corrosion layers electrolytically. However, as the equipment needed for electrolytic cleaning was not readily available, and due to the time factor involved cleaning was carried out using the sequestering agent di sodium ethylenediaminetetra acetic acid (EDTA).

The artefacts were immersed in a 10% solution of di sodium EDTA and closely monitored. As soon as all traces of the carbonate layer had been removed the objects were washed in a 10% solution of sulphuric acid to neutralise any alkaline chemicals present and to promote the formation of a protective layer of lead sulphate. Following this the artefacts were washed continually in de ionised water for five days to ensure that all traces of organic acids had been removed. The artefacts were solvent dried in acetone, and then air dried over silica gel for a further forty-eight hours. A protective coating of 1% Paraloid B72 (polymethyl acrylate/polyethyl methacrylate copolymer) in acetone was

ARCHAEOLOGICAL SURVEY OF INDIA / SOCIETY FOR SOUTH ASIAN STUDIES CONSERVATION RECORD		
SITE	LAB NO.	ACCESSION NO.
OBJECT	MATERIAL	EXCAVATION DATA
DATE RECIEVED	CONSERVATOR	DATE COMPLETED
PHOTO NO BEFORE	AFTER	
ANALYSIS REF.	X RAY NO.	
DESCRIPTION AND EXAMINATION		

TREATMENT
STORAGE RECOMMENDATIONS

FIG. 26 : *Conservation lab card*

applied to the surface and the artefacts packed as before using only materials free from organic acid radicals.

4. Copper alloy coins and artefacts

Copper alloys corrode in most archaeological environments in a complex and varied manner. The copper alloy antiquities from Sannathi showed no evidence for active corrosion on excavation, although they all had markedly different corrosion products covering their surfaces.

In the past chemical cleaning methods have been employed in the treatment of copper alloy antiquities as they are quicker and less time consuming for the conservator. However, research has shown that not only is it difficult to control the extent of chemical cleaning, as the cleaning agents can not detect discontinuities in an 'original' surface within the cuprite layer and can therefore destroy this information, but that they tend to leach further chemicals from the metal core rendering the object useless for analytical work (Cronyn 1990). Removal or damage to the copper I oxide layer by chemicals may also promote further corrosion. In view of these factors the decision was taken to clean all the copper alloy antiquites mechanically by a process of 'micro excavation'.

Cleaning was carried out with the aid of a binocular microscope using a scalpel, pin vice and glass bristle brush. Only those corrosion layers overlying the 'original' surface were removed, and great care was taken not to damage the original surface in any way. Where the surface was disrupted by warts of corrosion some of the overlying cuprite was left in position to avoid the promotion of further corrosion by removing the wart itself.

Following cleaning the artefacts were degreased in acetone and actively stabilized by immersion in a 3% solution of the corrosion inhibitor Benzotriazole (BTA) for six hours. The stabilized artefacts were air dried over silica gel for between forty-eight and seventy-two hours, and a protective coating of 1% Paraloid B72 in acetone applied to protect the delicate Benzotriazole film during handling. The artefacts were packed in pierced polythene bags as before.

5. Copper / gold alloys

Following extensive preliminary examination and some initial mechanical investigation a number of objects were shown to have a shiny, yellow metal surface below the corrosion layers, indicating the presence of gold within the alloy. All these artefacts had the same uniform green, copper corrosion layers, and a thick layer of black cuprite (Cu_2O) immediately overlying the metal surface. The remaining metal core appeared to be very fragile and brittle, probably as a result of intergranular corrosion, and so purely mechanical cleaning methods were temporarily abandoned.

The hard overlying corrosion layers were softened by the application of 10% Formic acid using swabs, following which they were removed with the aid of the microscope using a scalpel.The artefacts were washed continually for five days in de ionised water to ensure that all traces of the chemicals had been removed. Following cleaning the artefacts were degreased in acetone, the copper component stabilized by immersion in Benzotriazole for six hours and air dried over silica gel for up to seventy two hours. A protective coating of 1% Paraloid B72 was applied to the surface. As these artefacts were very fragile they were repacked in pierced polythene bags supported by ridged

polyethylene foam, or in the case of the larger objects in clear polystyrene boxes with a polyethylene foam base support.

6. Reconstruction Work

Following cleaning and examination it became evident that a number of the copper/gold alloy fragments were all part of the same object. Therefore, in order to understand and record the object it would be desirable to attempt to reconstruct the remaining fragments. However, the remaining metal core was extremely delicate and the edges badly worn making it very difficult to rejoin them. In order to afford some support to the joints small strips of polyester netting were applied to the back of the fragments using a Paraloid B72 based adhesive. This backing was both flexible and chemically inert, but provided adequate support. The Paraloid B72 adhesive can easily be dissolved in acetone or toluene and so the backing process was entirely reversible. A simple background support of polyethylene foam was provided for the object, which was packed into an air tight polyethylene box. The artefact could then be easily displayed and examined without necessitating it's removal from the supportive packaging.

B. THE OCCURRENCE OF MINERAL PRESERVED ORGANIC MATERIALS

(i) Introduction

The deterioration or preservation of artefacts in archaeological contexts depends not only on the nature of the material but on that of the burial environment. As the composition of all organic materials is based on carbon they are an integral part of the natural process of decay, and as such their carbon is recycled into the environment (Cronyn 1990). In most cases, therefore, it would seem unlikely that organic materials would survive burial. However, if some or all of the agents of decay, most notably water and oxygen in this instance, are absent or inactivated preservation will occur. On this basis organic materials were thought only to survive where water was excluded from the burial environment as in dessicated deposits, if it was inactivated by its transformation to ice at very low temperatures, or where oxygen was excluded as in anaerobic waterlogged or sealed deposits. However over the last ten years an increasing number of excavated metal artefacts have been found to have traces of organic materials preserved within their corrosion layers. These organic remains were not merely the usual organic debris which is associated with the burial environment such as seeds, insects and organic residues, but the remnants of organic objects which had been closely associated with the artefact during its period of manufacture and usage, or had been the organic components of a composite object. These organic materials have been preserved as a result of their proximity to corroding metal artefacts and are referred to as being mineral preserved.

During the final season of excavations at Sannathi a number of metal artefacts were uncovered which exhibited the characteristic traces of mineral preserved organic material. The occurrence of such material had not been recorded from archaeological contexts in India prior to this, and as such these artefacts warranted further investigation.

(ii) The mechanisms of mineral preservation

Mineral preservation of organic materials will only take place if the organic object is adjacent to or indirect contact with rapidly corroding iron, copper alloy or lead artefacts. Corroding iron, copper and lead all produce salts which protect the organic constituent from micro organism activity. The optimum environment for mineral preservation of organic material, therefore, is one which is aggressive to metals, thus causing the rapid formation of iron oxides or basic copper and lead carbonates (Watson 1988). For such reactions to take place the pH and redox potential of the system must be sufficient to enable active corrosion to proceed until passivation occurs (Cronyn 1990).

The actual mechanisms of mineral preservation are still not fully understood although much research work has been carried out in recent years (Barford 1979, Turgoose 1982, Jakes and Sibley 1984). All organic materials are associated with water which can be held within the capillaries by physical forces, absorbed on to the molecules and held in position by hydrogen bonding or can be a constituent of the molecule itself. It seems possible that as the adjacent metal work decays the Cu^{2+} and the Fe^{3+} ions which are produced replace some of the water and bond onto the hydroxyl groups forming solid compounds along the length of the individual fibres (Turgoose 1983). This delays the process of decay for a sufficient length of time to enable a record of the structural and surface details to be made in the corrosion layers.

(iii) Types of mineral preservation

Metal corrosion products appear to preserve organic materials in three ways (Watson 1988) :

1. Coating. — This is perhaps the most common form of mineral preservation, where the original organic material is coated with metal salts which inhibit the activity of micro organisms. This type of preservation usually occurs in the presence of copper or lead salts which have bacteriostatic properties and seal off the organic material preventing hydrolysis from occuring. The morphological structure is usually well preserved although rapid post excavation corrosion may lead to the formation of large crystals which disrupt and deform the organic traces making identification difficult. Wood, textile and animal fibres tend to be preserved in this manner.

2. Impregnation.—Here metal salt coat and impregnate mainly porous organic materials. The absence of toxic agents allows decay of the organic component to take place, although the presence of metallic salts does tend to delay the process (Keepax 1977). The resulting product is one which is completely mineralised and tends to be fragile and powdery. Bone, antler, ivory, horn and leather are best preserved in this way.

3. Replacement.—This type of preservation is usually observed in iron corrosion layers but can also take place to a lesser extent in the presence of copper corrosion products. The organic material becomes consolidated with corrosion products, following which it decays leaving a negative impression of its surface detail and structure in the corrosion layers. Wood, textiles and pelts preserved in this way usually exhibit fine surface detail, and where individual fibres have been encapsulated a mould of the surface detail usually remains.

(iv) Identification and physical appearance

To the naked eye organic materials preserved by metallic corrosion products appear as thin, flat

traces which differ in appearance and texture from the surrounding corrosion layers. Preservation by iron salts produces orange/brown traces which tend to be friable with a powdery texture. In the case of preservation by copper corrosion products the traces are usually dark green/black in colour and tend to be hard and brittle. Orange deposits may also occur on copper alloy objects if preservation has taken place in the copper oxide layer. Where preservation by lead salts has occured the organic material appears as a powdery cream/pale brown deposit similar to the surrounding lead carbonate corrosion crust.

The anatomical features of wood tend to be well preserved by metal corrosion products and accurate identifications can often be made using established microscopic keys for fresh wood samples. The species type may be identified from the many diagnostic features present in wood if it is possible to take samples from three planes i.e. transverse, radial longitudinal and tangential longitudinal (Watson 1988). However, owing to the friable nature of replaced wood it is often difficult to obtain cross sections and so identification has to be based on longitudinal sections alone.

Various types of animal tissue may be preserved by corroding metalwork. Unlike wood they do not have an enormous number of diagnostic features, and so in most cases it is only possible to identify the type of material present. However, each type of material has some distinguishing feature which can aid identification. Bone can be positively identified by the presence of Haversian canals which may be observed both in longitudinal and cross section, whereas ivory has no canal system, but dentinal tubules may be visible at high magnifications (Moraitou 1983). Horn is often visible as a series of parallel ridges and can be difficult to distinguish from wood unless examined at high magnifications, when it can be identified by the lack of morphological features (Cronyn *et al.* 1985).

Leather and its associated skin products such as fleece and pelts have also proved difficult to identify to species level. Identification of skin types is usually based on the grain layer present in the upper section of the corium. The compact interweaving of fine collagen fibres forms a smooth surface interrupted by empty hair follicles which give rise to the distinguishing grain patterns. If the grain pattern is well preserved the skin type can be identified using simple keys or a reference collection (Mclane 1984). However, if most of the grain pattern has been lost it may only be possible to distinguish it from other animal tissues. Hairs of pelts and fleeces tend to be well preserved and are easily identified as large concentrations of hairs are often clearly visible on the surface. In some cases the species type can be identified from the distinctive bract patterns which remain as negative imprints in the moulds which the hairs make in the corrosion layers prior to their decay.

Metal corrosion products tend to encapsulate individual textile fibres without distorting or disturbing the weave or stitching, thus making idenification very simple. Where textiles are preserved by copper corrosion products the individual fibres are often preserved intact, and so it is possible to carry out standard examinations (Edwards and Watson 1982).

(v) Techniques used for identification

Low powered incident light microscopy is essential for all initial examination and cleaning carried out on archaeological artefacts and is therefore, used for the initial identification of mineral preserved materials. Low magnifications (X6 - X15) will reveal the 'organic' nature of traces, as without magnification they may appear to be very similar to the surrounding corrosion products.

Higher magnifications (X12 -X30) will reveal some surface features and in most cases will enable an identification of the type of material present. The scanning electron microscope has been employed to study both surface detail and the internal structure of samples. Its greater magnifications and depth of field allow the identification of many morphological and diagnostic features which may be visible on the surface or in cross section.

(vi) Artefacts with Mineral Preserved Organic Traces

A total of five copper alloy and two iron artefacts showed evidence for organic materials which had been preserved by metal corrosion products. Four of the copper alloy artefacts (Accession no. 469, 473, 477 and 479) appeared to be very similar consisting of a number of curved lengths of thin copper alloy sheet, with a convex outer surface decorated with a series of horizontal bands (pl. XXXVA). The inner surface is concave with a central groove running along the full length of each fragment (pl. XXXV B). At various points along the length of the object small copper pins had been hammered through the surface (pl. XXXVI A). All the fragments displayed characteristic copper corrosion products in the form of a hard, compacted layer of dark green corrosion, below which a continuous layer of black 'glass like' corrosion was visible covering the surface of the metal. Around the copper alloy pins a compacted orange/brown deposit was observed adhering to the surface (pl. XXXVI B).

The fifth copper alloy object (Accession no. 474) consisted of four fragments of thin copper alloy sheet, with a series of regular indentations punched into the surface of the metal along the outer edges (pl. XXXVII A). The largest fragment appeared to have the remains of a small copper alloy nail or pin in the top left and right hand corners. All the fragments were covered by earth and a discontinuous layer of dark green corrosion products, below which a uniform black corrosion layer was visible covering the surface of the metal. Around the two small nails a compacted orange/brown deposit was clearly visible (pl. XXXVII B).

The two iron objects (Accession no. 488 and 415), a spearhead (pl. XXXVIII A) and two pieces of thin, folded sheet (pl. XXXVIII B) were covered in thick layers of amorphous orange/brown corrosion products mixed with earth. However, on both objects a soft, powdery, bright orange deposit was clearly visible in some areas. On the spearhead these deposits were mainly concentrated in small patches at the base of the point and along the edges (pl. XXXIX A). The distribution of the bright orange deposits on the fragments of iron sheet was randomly spread across the whole surface.

1. INTERPRETATION. —From the contextual evidence it seemed probable that four of the copper alloy artefacts (Accession no. 469,473,477 and 479) were in fact fragments of the same object. The occurrence of the mineral preserved wood around the copper pins seemed to indicate that they had been used to attach the copper alloy fragments to a wooden artefact of some kind. Attempts to reconstruct the original appearance of the object based on the fragments of mineral preserved wood proved to be difficult as the races were very friable, making it impossible to correctly determine the direction of the grain. From the evidence therefore, it is only possible to suggest that the copper alloy fragments were part of a composite object; perhaps an edging for a casket of some kind or part of a frame. Conservation of the fragments revealed the presence of gold in the alloy. This could indicate that the edging or frame was part of an object of value and importance or one which had religious

significance.

The four fragments of copper alloy sheet (Accession no. 474) were also found to contain gold and were discovered in association with the other fragments. It is possible to assume therefore, that they may also be a part of the same object. The presence of mineral preserved wood around the corner pins again suggests that the fragments were attached to some form of wooden object. As the fragments were not planned *in situ* it was not possible to determine their exact relationship with the other copper alloy artefacts, but it seems possible that they could have formed part of a backing for a frame or part of a plate attached to a box or similar wooden object.

The traces of mineral preserved wood on the base of the spearhead indicate that it had been attached to a wooden shaft at some time prior to burial. The purpose of the fragments of folded iron sheet is not known, but the presence of the mineral preserved wood suggests that it was part of a metal fitting for a wooden object.

2. EXAMINATION AND CONSERVATION. —Following the initial pre-treatment examination all the above artefacts were set aside for further investigation. Examination using a low powered incident light microscope confirmed that the unusual deposits adhering to the corrosion layers were traces of organic material which had been preserved by the corroding metal artefacts. The objects were then examined at a higher magnification and photomicrographs taken. This confirmed that the traces were mineral preserved wood (pl. XXXIX B). In all cases the mineral preserved material was in a very poor state of preservation and had become extremely powdery and friable (pl. XL A). As such it was impossible to obtain samples for the scanning electron microscope and therefore, obtain a positive identification and an indication of the species type.

As no further analysis could be carried out on the samples, it was decided to continue with the cleaning of the objects, leaving the mineral preserved wood intact. Initially it was intended to clean the copper alloy artefacts mechanically, but initial investigative work using a scalpel revealed the presence of a shiny, yellow metal surface immediately below the continuous black corrosion layer. This implied the presence of sizeable quantities of gold within the alloy, which could easily be damaged by mechanical cleaning methods. The earth and heavy green corrosion layers were carefully removed under the microscope using a scalpal to reveal the black corrosion layer below. A 10% solution of Formic Acid was then applied using cotton wool swabs to remove the black corrosion layer without disturbing the mineral preserved wood. Following cleaning the artefacts were rinsed for four days using deionised water and were then stabilised by immersion in 3% Benzotriazole for six hours. The objects were air dried over silica gel for seventy-two hours, and a protective film of 1% Paraloid B72 applied to protect the Benzotriazole film.

An attempt was made to join the major fragments of the frame/edging, but the edges were extremely thin and worn which prevented keying of reversible adhesives. As a result a supportive backing of small strips of polyester netting was applied to the reverse surface of the fragments using a Paraloid B72 based adhesive. This backing was both flexible and chemically inert, but provided adequate support (pl. XL B). The Paraloid B72 adhesive can easily be dissolved in acetone or toluene and so the process was entirely reversible. A simple background support of polyethylene foam was provided for the object, which was packed into an air tight polyethylene box. The artefact could then

be easily displayed and examined without necessitating its removal from the supportive packaging.

The iron artefacts appeared to be stable and showed no evidence of active corrosion or chloride action. Both were cleaned mechanically under the microscope using a scalpel and pin vice. The mineral preserved wood was left undisturbed, and only the dense orange brown corrosion products and earth removed to reveal the black magnetite (Fe_3O_4) layer below. Although badly pitted this was taken as being representative of the original surface layer. The objects were packed into pierced self seal polyethylhene bags and stored in air tight polyethylene containers with self indicating silica gel as a dehumidifier.

(vii) Conclusion

It is perhaps not too surprising to find mineral preserved organic materials in a context such as Sannathi. The burial environment is composed of black cotton soil which is well aerated and retains water at the time of the monsoon, but dries out quite rapidly once the rains cease. This would lead to initial rapid corrosion of the metalwork, in which time the organic component would be preserved, followed by subsequent periods of stabilisation where the artefact would be able to achieve equilibrium with the burial environment.

Perhaps more than anything, the occurrence of mineral preserved material has provided support for the case of extensive pre-treatment examination of artefacts, coupled with adequate documentation. Although relatively time consuming it can provide the excavator and conservator with valuable information which is all too often lost once the process of conservation begins.

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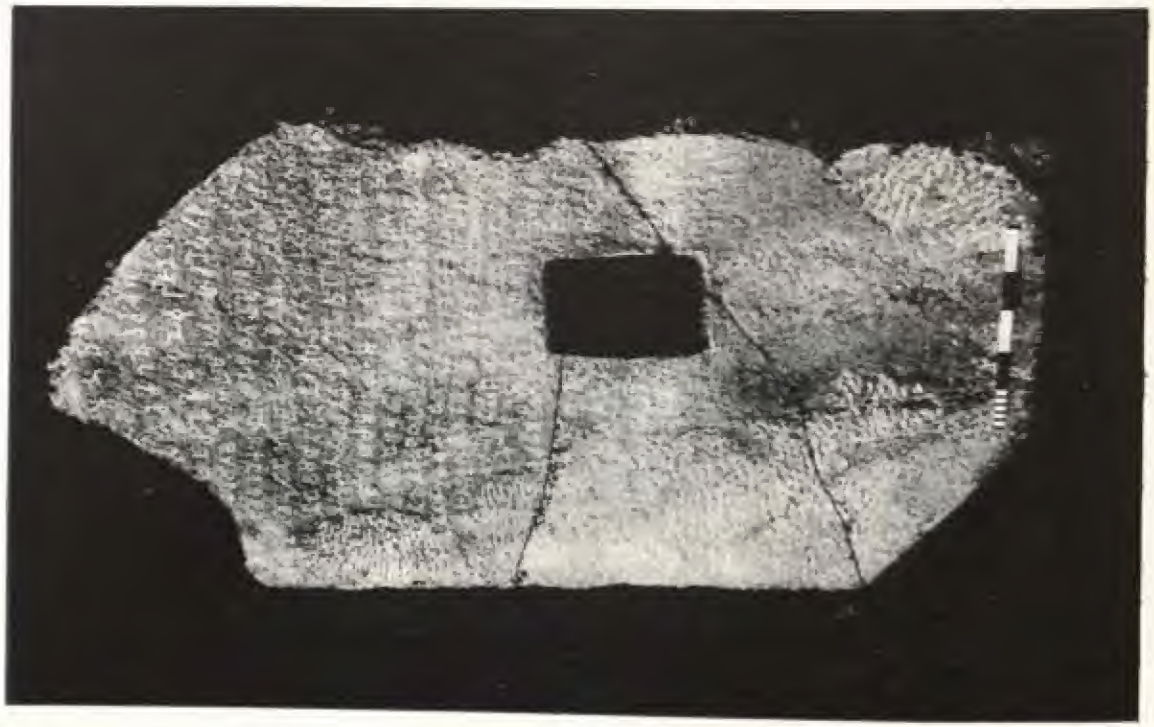
A

B

A, *view across fields to the fortification wall* ; B, *second stupa mound before excavation. See p. 1*

A



B

Asokan Edicts. See p.3

B

A

Cross section through A, *north of mound and* B, *south of mound. See p.13*

A

B

Stone revetment of mound: A, at *north cardinal point and* B, *with later brick structure. See pp. 13 and 16*

A

B

A, stone revetment of wall with peripheral structures; B, Post-hole with stylobate block. See pp. 16 and 19

B

A

A, steps to small platform against brick drum wall; B, pillared structure in north-east of mound. See p.19

A

B

A, *drain* ; B, *reconstruction of a portion of tile roofing.*

See pp. 20 and 22

A

B

Platform at south cardinal point : A, *east wall and* B, *west wall.* *See p.22*

A

B

Platform at south cardinal point : A, *entrance portico and* B, *shale makeup. See p.* 22

A

B

Platform at south cardinal point : A, *robbing cut for memorial slab and* B, *locations of memorial slabs.* *See p.23*

A

B

A, *double post-holes;* B, *broken sculpture fragments around drum. See pp.23-24*

A

B

A, *fragment of memorial slabs from excavation* ; B, *bottom fragment of a memorial slab. See pp. 23-24*

A

B

A, *top of the fortification wall* ; B, *Ranamandala mound. See pp. 27-28*

A

B

A, *Outer city with fortification in distance* ; B, *fragment of sculpture with inscription.* *See p. 28*

A

B

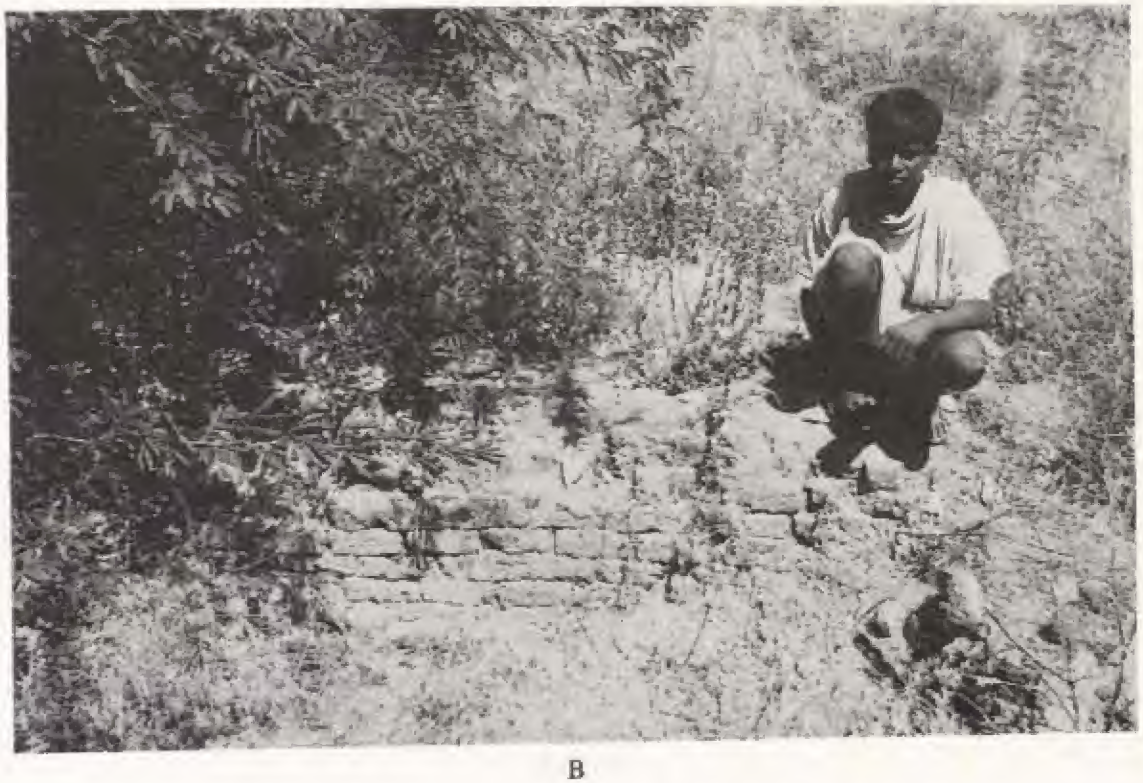
A, *view of Stupa* 1 *with Durga shrine in the background;* B, *memorial slab.* *See p. 29*

A

B

A, *remains of Stupa 1 with mandapa pillars in field;* B, *Stupa 3. See p. 29*

A



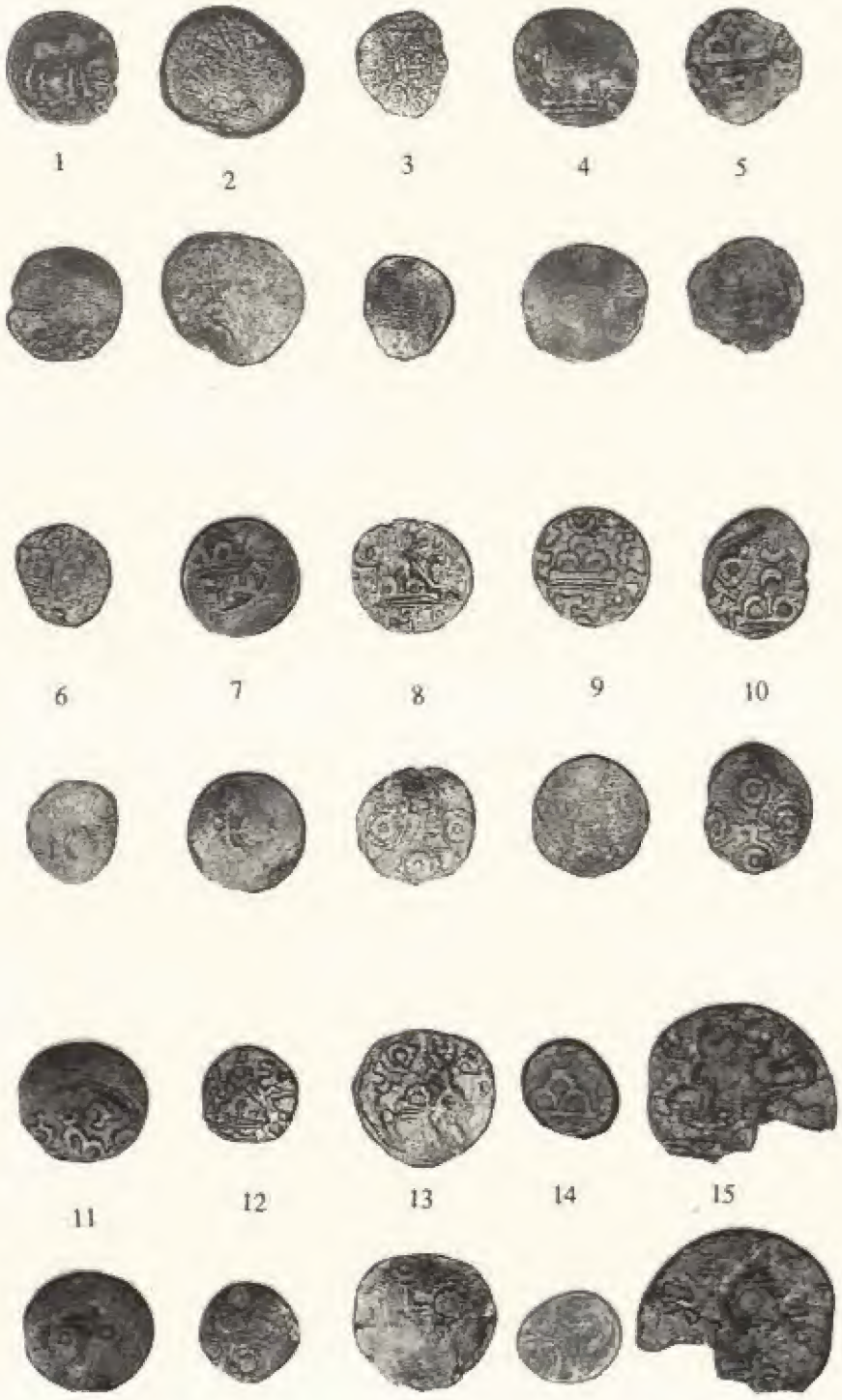
B

Benagutti : A, *sculpture of Ganesa ;* B, *brick structures. See p. 29*

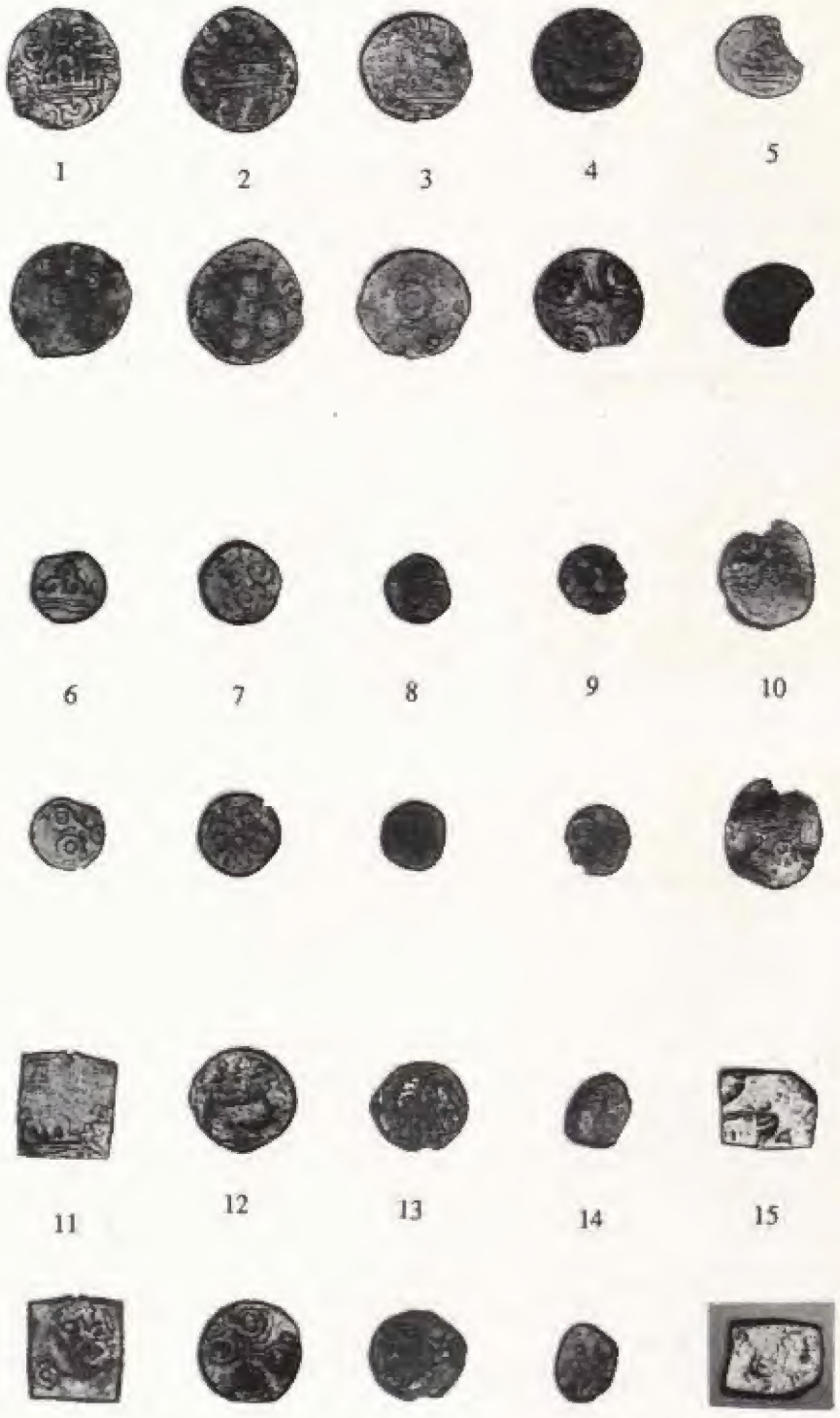
A

B

A, *Buddha Pada from outside Chandralamba temple;* B, *bathing ghat.* *See p. 30*



Coin types. *See p. 45*



Coin types. See p. 45

B

A

Memorial stones. See p. 70

A

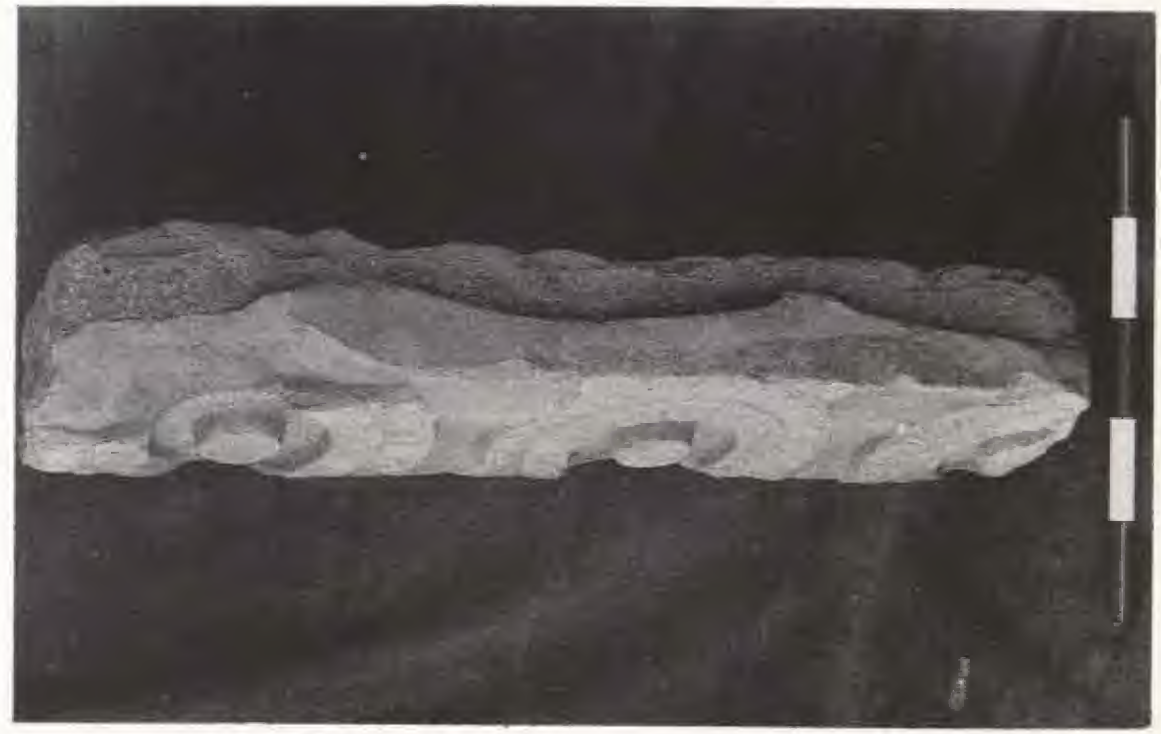
B

Fragment of memorial stones. See pp.70 and 77

A

B

Inscribed fragment of memorial stones. See pp. 70 and 75



B

A

A, inscribed fragment of memorial stone; B, railing fragment. See pp. 70 and 80

A

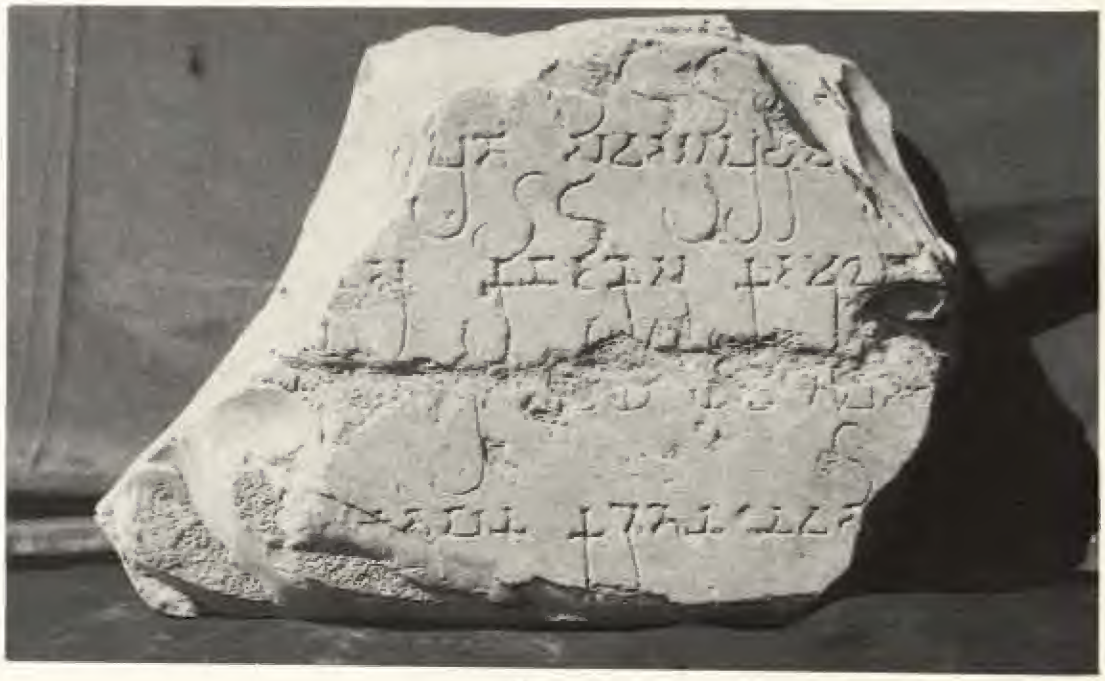
B

Inscribed stone panels. See pp. 81-82

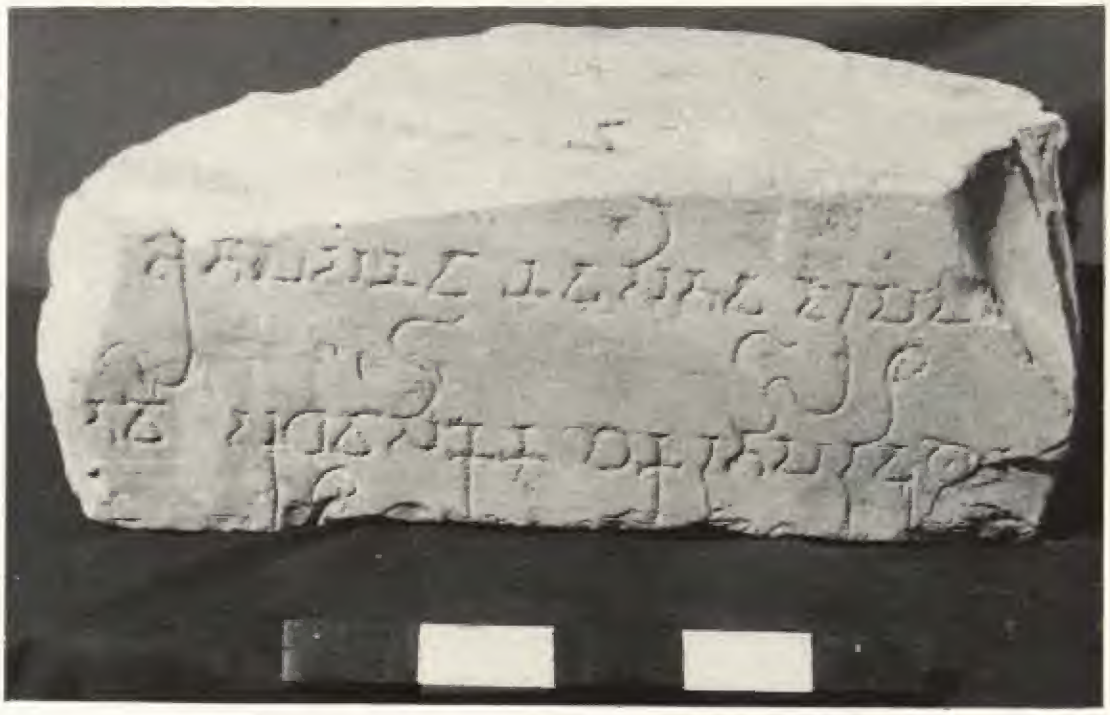
A

B

Inscribed pillar fragments. See p. 94



A



B

Inscriptions of Sivasiri Pulumavi. See p. 83

A

B

A, *bangles, rings and earstud* ; B, *finger and toe-rings. See pp. 85-86*

A

B

Beads. See p. 86

A

B

A, *bronze pin, kohl applicators and iron needle;* B, *cast copper discs. See pp. 86 and 88*

Terracotta objects. See p. 88

Iron objects. See p. 88

A

B

A, *brick drum wall and pillared structure;* B, *Stupa 2, before excavation (colour).* *See pp. 16 and 29*

A

B

A, *platform at south cardinal point;* B, *entrance to* [illegible]*m (colour). See pp. 22-23*

A

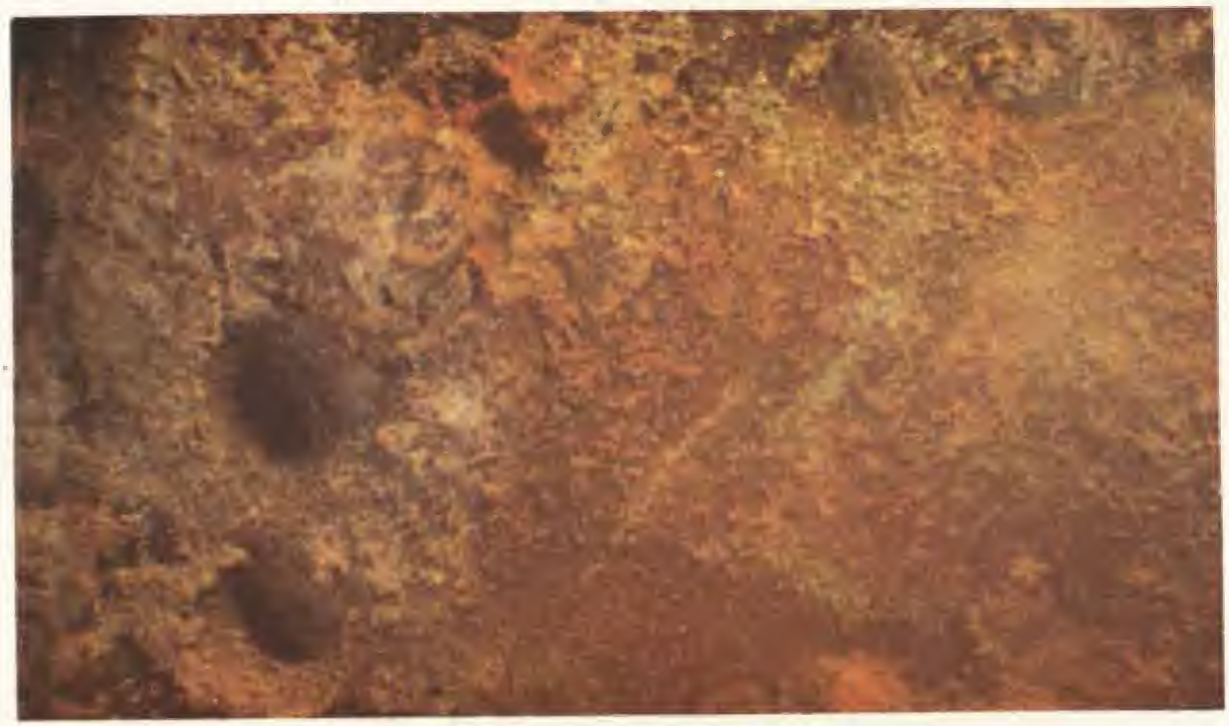
B

Details of outer and inner surface of copper alloy artefacts (colour). See p. 99

A

B

Details of corrosion around copper alloy artefacts (colour). See p. 99



A

B

Details of corrosion products on copper alloy artefacts (colour). *See p. 99*

A

B

A, *spear head and* B, *folded iron sheet (colour). See p. 99*

A

B

A, *details of corrosion products and* B, *mineral preserved wood (colour). See pp. 99-100*

A

B

A, *details of mineral preserved wood.* B, *complete frame (colour).* *See p. 100*

Excavation - Sonnathi